POWER

A McGRAW-HILL PUBLICATION—ESTABLISHED 1884

ELY C. HUTCHINSON, *Editor*

Volume 73 NEW YORK, FEBRUARY 10, 1931 *Number 6*

Self-Discipline

A FORMER Secretary of Agriculture, a foremost educator of his time, once said that "Education consists of doing things you don't like to do at a time that you don't want to do them."

No one likes to hoe corn at any time. It is especially hard to stick to it when one wants to go fishing.

Being made to keep at it is an education, not in the art of hoeing but of disciplining one's self for the battle of life, in the service that one must render to pay his rent to the world.

It is a lesson in perseverance, in self-discipline, in application to one's appointed task. It teaches the pleasure of accomplishment, of useful work well done and of deserved emolument. It makes a man independent and self-supporting instead of an indigent hanger-on to the skirts of his community.

American professional, business and industrial life is rich in examples of men who have attained to high honors and to commanding positions from early circumstances which compelled from them persistence in onerous, disagreeable exposure and toil.

There are some kinds of work that one does for the sheer love of it. Its interest is compelling and its prosecution is a sport.

Happy the man who has found a line of activity that he can pursue in this kind of a spirit. He will surpass in it, and if it is something useful, anything more than plowing the waves, he will ride it to affluence over an easy road.

But most toilers, especially in the routine lines, are held to their tasks not by the love of them, of pride in their technique or interest in their progress but by the anticipation of their rewards. Their satisfactory pursuit means continued opportunity. Their accomplishment means shelter and sustenance and a share in the good things of life. Superior skill, expertness or productiveness means a more abundant portion in the enjoyment of the products of the labors of others.

And as one learns the satisfaction of getting things done, of difficulties overcome, of responsibilities assumed and discharged, one absorbs the education that makes him an effective, successful workman, and perhaps an inspiring leader.

EDITORIAL

New Equipment Responds To Present Power Demands

INDUSTRY, as never before, is investigating its power problems, searching for means to increase efficiency, eliminate waste, lessen the hazard of manual operation through automatic control, reduce maintenance and decrease outage time —all with a view to lowering costs. These efforts at present are reflected more in plant improvements and replacement of obsolete equipment than in increased capacity.

How well power equipment manufacturers have responded to this demand with improvements in nearly all lines is apparent from the contents of this number of *Power,* which contains a review of new equipment described currently during the preceding twelve months.

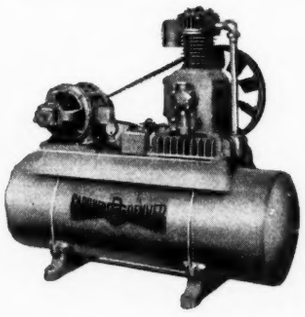
The Equipment Review Number, inaugurated in 1929, to provide a useful reference to show, within one cover, the advances in equipment design, met with such favorable reader response that it has become an annual feature.

Outstanding among the designs described are: improved pulverized coal burners and grinders; speed transmission devices; speed control for power station auxiliaries; dust collecting equipment; ash- and coal-handling systems employing anti-friction bearings; unit heaters with special control features; and inclosed motors in which the windings are sealed from contact with the ventilating air. A marked advance has also been made in propeller pumps, and among the prime movers commanding attention are the vertical high-sped uniflow engine, and refinements in the nozzles and combustion chambers of solid-injection diesels.

Those readers who are privileged to attend the Mid-West Power Exposition in Chicago this week will have an opportunity to inspect many of these new designs.

Air Compressors, Filters and Accessories

Among the outstanding innovations are a compound compressor with single-acting high-pressure and double-acting low-pressure cylinder, and a gas developed to saturate the moisture in compressed air lines and prevent freezing at temperatures below 70 deg.



Self-Contained Air-Compressor Unit

A feature of this compressor is inclosure of the suction and discharge valves in separate compartments, which prevents the air from being heated when passing through intake valves. An automatic or hand-operated start and stop control is furnished as standard equipment and operated in conjunction with the Penn-type pressure and moisture unloader. The unloader is set to cut in at 130 lb. and out at 165 lb. The unit has a displacement of 26 cu.ft. per minute, operating at 600 revolutions per minute.

Other features of the compressor are: V-type belt drive; a fan type of flywheel for circulating air across the cylinder; roller bearings; aftercooler in the compressor base; and a muffler for the suction opening.

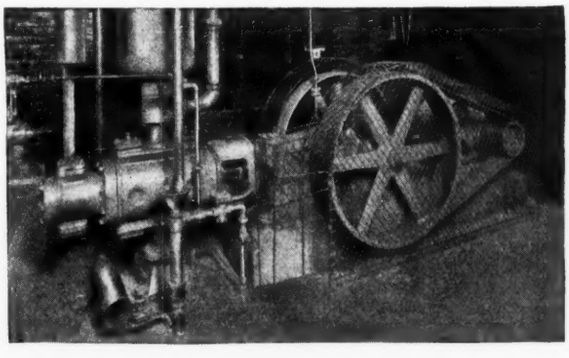
Gardner-Denver Company, Quincy, Ill. April 1, page 529.

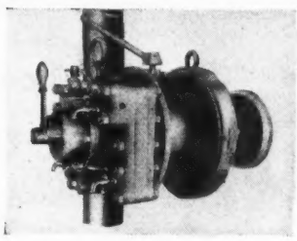
Compound Compressor With Single-Acting High-Pressure Cylinder

A single-acting, high-pressure cylinder and a double-acting, low-pressure cylinder are used in this line of two-stage tandem-type air compressors designated Class 14A and 15A. Units are available in strokes from 5 to 8 in., inclusive, for the power-driven and from 6- to 8-in. stroke, inclusive, for steam-driven, and for pressures up to 250 pounds.

A plunger at the outer end of the rod acts as the piston for the high-pressure cylinder, and compresses air in this cylinder at only one stroke of the rod. An intercooler is incorporated in the air connection between the two cylinders.

Pennsylvania Pump Compressor Company, Easton, Pa. Dec. 30, page 1062.

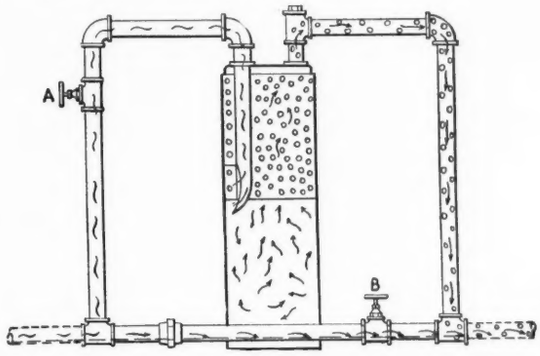




Single-Drum Air-Steam Hoist

Nos. 8 and 10 Leadville single-drum air or steam hoists are equipped with an engine of improved design having balanced pistons and air control through balanced spool valves with increased port area. Model 8 is rated at 6 hp., with a rope pull of 2,000 lb. at a speed of 150 ft. per minute. The drum is 6 in. in diameter x 9¼ in. wide, with a capacity of 620 ft. of ⅝-in. rope. All moving parts are fully inclosed. A non-destructive clutch connecting and disengaging the drum from the gear set is operated with a lever. Crankshafts of heavy forged steel run in ball bearings.

Gardner-Denver Company, Denver, Col. March 11, page 408.



Gas to Prevent Freezing of Compressed-Air Lines

The function of "Tannergas" in a compressed-air system is to saturate the moisture in the lines so that it cannot freeze at the lowest temperatures to which the lines may be subjected. It is claimed that it will not wash off or affect the lubrication of pneumatic tools. It is harmless, non-explosive and has a freezing point 70 deg. below zero.

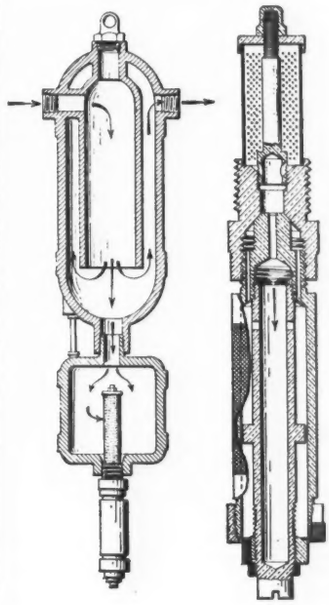
The system consists of a tank half filled with liquid which can be installed in existing compressed-air lines simply by removing a short section of the pipe.

Air allowed to enter the tank agitates the liquid to a point where it gives off a gas. The latter passes out through the top opening of the tank with the air to the main air header. When not needed the system is readily cut out by operating two valves. Tannergas is supplied in 30-, 50- and 75-gal. drums.

Sullivan Machinery Company, Chicago, Ill. June 24, page 1006.

Moisture-Eliminator for Compressed-Air Lines

Elimination of water from compressed air as it collects, instead of intermittently, is a feature of this oil and water eliminator. The principle of



operation of the eliminator differs from that of a trap in that it is never closed and retains no oil or water, these being expelled immediately.

Air enters the separator and passes into a chamber which has an area nine times that of the inlet. This reduces the velocity and allows the air to expand and precipitate any oil and water into the chamber of the eliminator. From there the water passes through a central port of a bypass valve and vent valve to a muffler chamber and is finally discharged to the atmosphere.

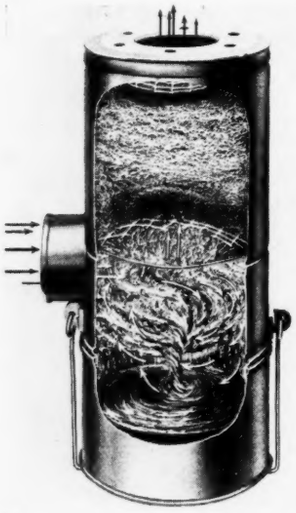
Swendeman Corporation, 791 Tremont St., Boston, Mass. Sept. 2, page 403.

Air Cleaner for Compressors and Oil Engines

This air cleaner consists of a chamber divided into two compartments separated by a baffle. The upper part is loosely filled with crimped wire, forming a metallic filter, and the lower part consists of a cup containing light engine oil.

Boilers, Economizers and Auxiliaries

Low-head water-tube boilers now include units from 900 to 6,000 sq. ft. of heating surface. Small gas-fired high-pressure units are available. A number of water columns, water gages and other accessories for high pressure have been introduced.

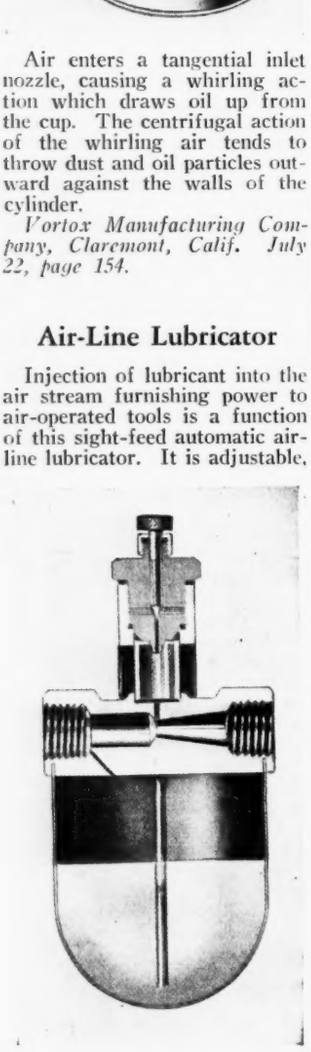


Air enters a tangential inlet nozzle, causing a whirling action which draws oil up from the cup. The centrifugal action of the whirling air tends to throw dust and oil particles outward against the walls of the cylinder.

Vortox Manufacturing Company, Claremont, Calif. July 22, page 154.

Air-Line Lubricator

Injection of lubricant into the air stream furnishing power to air-operated tools is a function of this sight-feed automatic air-line lubricator. It is adjustable,



by means of a needle valve, to any demand. Oil is injected into the air line a drop at a time, which, when it comes in contact with the air stream, is dissipated into a fog. The device is available in ⅜-, ½-, ¾-, and 1-in. sizes.

J. N. Fauver Company, 31 Brady St., Detroit, Mich. Sept. 2, page 402.

Three-Drum Bent-Tube Boiler

Of built-up design, this boiler has three drums of the same diameter connected by bent tubes, spaced in pairs to permit of easy removal. The unit is suspended independently of the brickwork by a structural steel frame which also serves to stay the brickwork and makes it possible for the unit in sizes of 18 tubes wide and smaller to be completely erected in the shop and shipped built up with the exception of the four legs, which are added in the field. The legs raise the boiler to the required height.

A specially designed steam header, slightly above and parallel with the front drum, is connected to the top rear drum by superheating tubes. This design, in addition to giving slightly superheated steam, permits of a considerable saving in headroom. Provision is made in the design for the installation of a standard superheater without altering the boiler design or interfering with accessibility.

The unit is made in three lengths and in sizes up to 40 tubes wide and 6,000 sq.ft. of heating surface.

Erie City Iron Works, Erie, Pa. Aug. 5, page 229.

Steel Heating Boiler

This steel heating boiler can be fired with any fuel and can be used for either steam or hot-water heating. In a coal-

fired setting a slotted refractory curtain wall supported on a water tube, and a refractory bridge wall are used. The front and rear smoke boxes are built into the boiler, and the design of the firebox crown sheet is such as to avoid so far as possible any pocket for the collection of mud or sediment over the fire, and to be practically self-cleaning.

All boilers included in this line are built for a working pressure of 30 lb., and the sizes range from 259 sq.ft. of heating surface to 2,153 sq.ft., with corresponding capacity in square feet of radiation from 3,500 to 28,000, respectively.

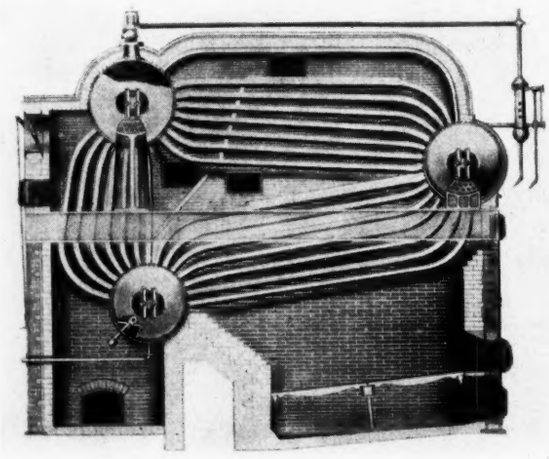
Erie City Iron Works, Erie, Pa. Feb. 18, page 267.

Low-Head, Three-Drum Water-Tube Boiler

Available for power and heating service in a wide range of sizes and working pressures, this low-head water-tube boiler is particularly suitable for installation where headroom is limited.

The boiler comprises three drums connected by bent tubes 3½ in. in diameter, there being approximately the same number in each bank. This arrangement of drums and tube banks is designed to give unrestricted and balanced circulation at all ratings. The main tube bank is inclined, and the entire lower row is exposed to the radiant heat of the furnace.

The boiler is suspended inde-



pendently of the brickwork by a structural-steel frame. The two upper drums are supported from a cross-member as shown, and the lower drum is carried by the tubes. By reason of the compact design many of the smaller and medium-sized units can be shipped completely assembled. The setting can be arranged for stoker firing of coal, as well as for gas or oil.

E. Keeler Company, Williamsport, Pa.. Dec. 30, page 1063.

Single-Pass Three-Drum Waste-Heat Boiler

Single horizontal gas pass, high-heat transfer, effective dust precipitation, low draft loss and freedom from brickwork trouble are some of the features of this waste-heat boiler. It comprises one upper steam and water drum and two lower mud drums, connected by bent tubes. The tubes are staggered and are bent closer together in the rear portion than in the front of the unit. Vertical baffles in the rear portion prevent gas lanes and assist in dust precipitation. By reason of the vertical arrangement of the tubes and baffles unusually effective dust precipitation is obtained. The complete superheater unit, which is of the inverted type, is suspended in the gas pass, the position in the pass with respect to the gas inlet depending upon the gas temperature and the degree of superheat desired.

To permit free expansion of the boiler and to eliminate brickwork trouble and air infiltration, the firebrick, insulation and tile are supported independently of the boiler within a steel casing. The boiler itself is supported by the two lower drums.

Babcock & Wilcox Company, 85 Liberty St., New York City. Oct. 14, page 624.

Self-Contained Return-Tubular Boiler

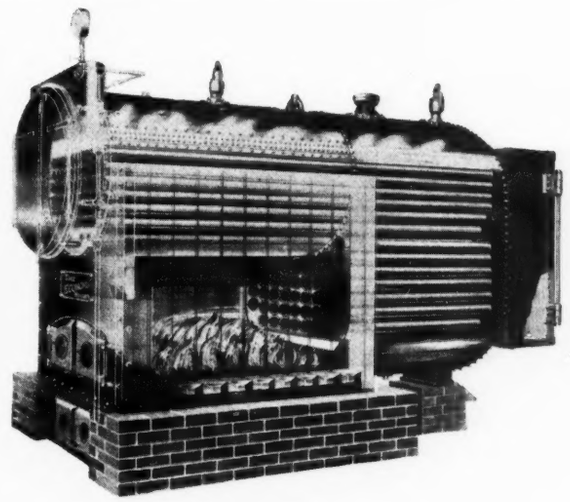
Replacement of the principal cast-iron parts with steel-plate construction wherever practical is one of the important improvements made to this model of the "Economic" boiler.

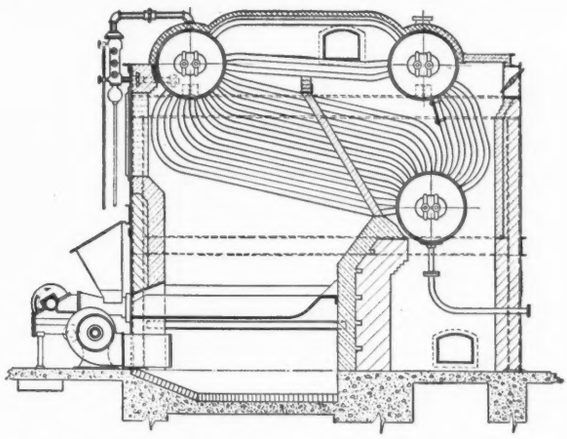
With the exception of the firedoors and ashpit doors, which are of cast iron, a complete steel front can be furnished with a welded-steel stack saddle on the smoke box. The rear combustion chamber is also of steel and is refractory-lined. A complete steel ashpit eliminates the need of any outside brickwork.

A firebrick arch of special design is used over the firing doors, and a dead air space is provided on the side walls of the furnace by means of special-shaped refractory.

Units ranging from 100 to 2,000 sq.ft. of heating surface for pressures of 100, 125 and 150 lb. are available.

Erie City Iron Works, Erie, Pa. Feb. 11, page 228.





Three-Drum Water-Tube Boiler

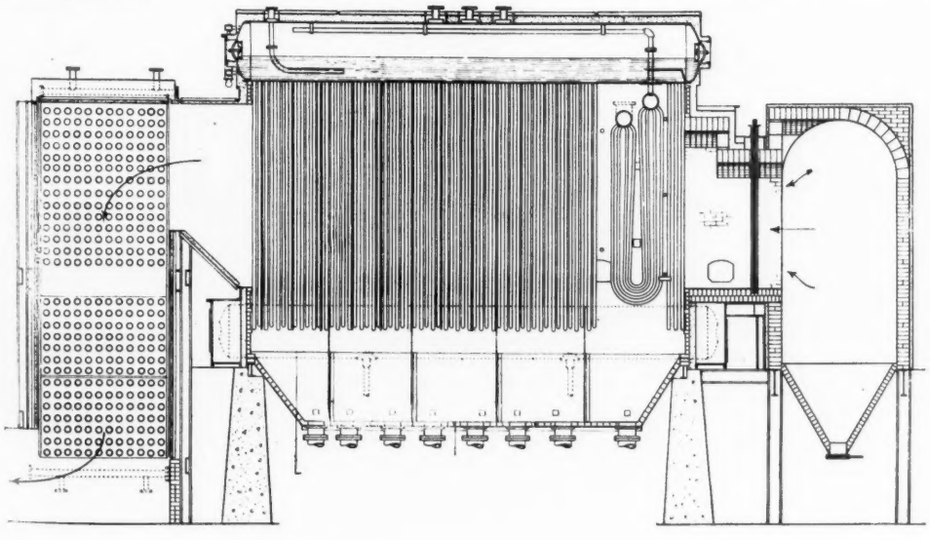
Designed for medium-sized installations and limited space conditions, this L-type three-drum, bent-tube boiler is made in sizes from 900 sq.ft. of heating surface up and for a wide range in working pressures. The two upper drums are located on the same horizontal center line and are connected by two rows of water-carrying tubes. The main tube bank is inclined, and the entire lower row is fully exposed to the radiant heat of the furnace.

The design of the boiler and baffling provides for either top or rear smoke outlet, as best meets installation requirements.

A full-steel suspension construction consisting of I-beams and H-columns is regularly furnished as standard equipment. The suspension carries the entire weight of the boiler. Because of its compact arrangement the boiler can be shipped completely shop-assembled in many sizes. The setting can be arranged for hand or stoker firing of coal, as well as for gas or oil burning.

Sizes available range from 8 to 24 sections wide, with heating surfaces of from 900 to 4,650 square feet.

Union Iron Works, Erie Pa. Oct. 28, page 701.

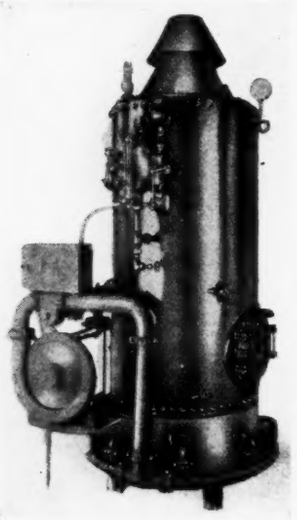


Small Gas-fired High-Pressure Boilers

Each of the four units comprising this line of gas-fired high-pressure boilers is a complete steam-generating plant, consisting of a vertical fire-tube boiler shell, furnace, burner system and controls.

Tubes are 1½ in. outside diameter, and each is fitted with a restrictor to improve circulation and heat transfer. The combustion system comprises a forced-draft gas burner, with the burner tuyères in a radial-tangential arrangement.

All combustion air is supplied by a motor-driven blower. Air under pressure draws gas from the supply line and forms a complete combustion mixture before reaching the burners. Other automatic control features are off-and-on operation of burner system, low-water safety cut-out, pilot-light safety cut-off and water level regulator. Units having capacities of 350, 450, 600 and 800 lb. of



steam an hour normal rating are available.

Steam & Combustion Company, 205 W. Wacker Drive, Chicago, Ill. July 8, page 74.

Extended-Surface Economizer

External and internal return bends, two separate water circuits, and fin tubes are some of the features of this extended-surface economizer. The heat absorbing elements are constructed by connecting straight-finned tubes in series by U-bends. The adjacent vertical tube sections are arranged so that the open ends of the U-tubes alternately enter one end and then the other of the economizer casing. Both water circuits are served by common inlet and outlet headers.

Compactness is effected through the use of fin tubes, which reduces the tube length per square foot of heating surface, and by the return-bend.

Combustion Engineering Corporation, 200 Madison Ave., New York City, July 29, page 191.

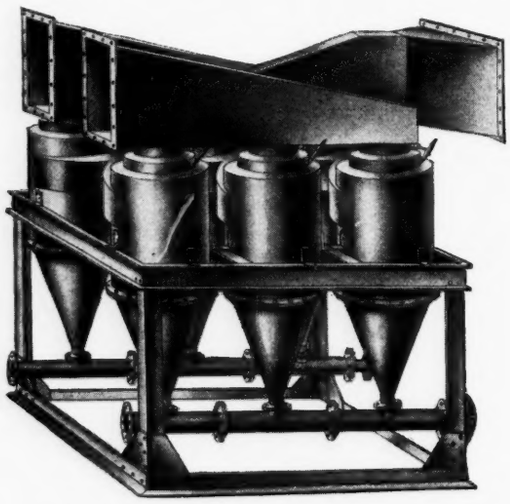
Multi-Cyclone Dust Collector

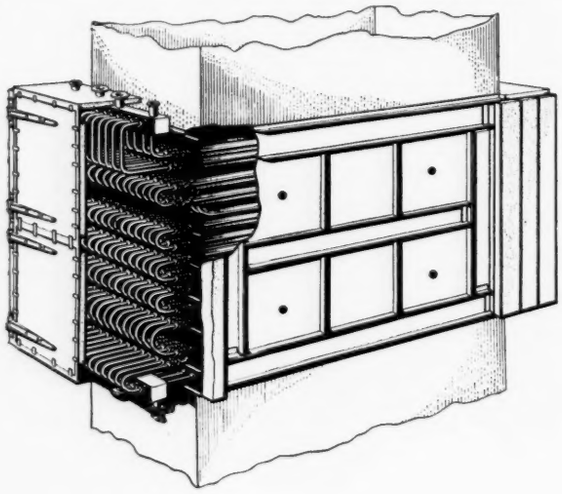
In Thermix No. 5 multi-cyclone dust collector without a combined fan a variable number of small-diameter cyclones are arranged in a compact right- and left-hand unit, all of the cyclones being standard in size and dimensions. Gas enters through a single central duct, distributes to the various cyclones, as controlled by dampers on the inlet to each cyclone, and leaves through a dual discharge.

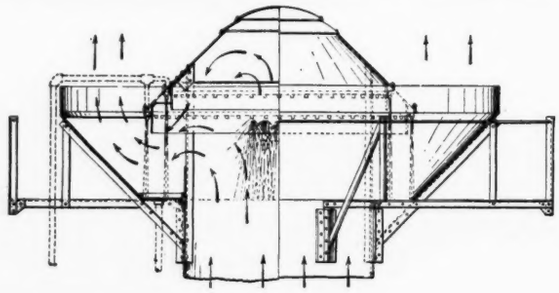
An important feature of this design is the ability to change automatically, with varying requirements, the number of cyclones in operation. It also permits the use of small-diameter cyclones.

The cyclones are lined with steel or cast-iron wearing plates that are readily interchangeable in any unit. The wearing parts in the duct work are similarly protected. Removal of the dust from the bottom of the cyclones is accomplished by means of small-diameter screw conveyors.

Prat-Daniel Corporation, 183 Madison Ave., New York City. Jan. 20, 1931, page 121.







Washer for Boiler Gases

In the down-jet, spray-type flue-gas washer illustrated an inverted cone is fastened to the top of the existing stack, with a dome-shaped canopy slightly larger in diameter than the stack supported centrally above it. On the inner side and near the lower edge of the canopy are attached two spray coils, as shown. Each coil is fitted with a sufficient number of flat spray-type nozzles to produce a thin, circular curtain of water completely surrounding the stack.

In passing from the stack to the atmosphere the gases must go through two curtains of water, the velocity of the water leaving the nozzles and the complete curtain formed by it serving to throw down the particles of fly ash and soot as well as to remove the sulphurous fumes. To prevent any gas escaping between the nozzles or above the curtain, there are circular baffles directly inside the spray coils.

A motor-driven centrifugal pump is used to maintain the pressure (20 to 30 lb.) on the spray coils. The drain from the spray is led to a recirculating screen tank, where, by means of screens and baffles, solid particles are precipitated and the water is recirculated through the nozzles by the pump.

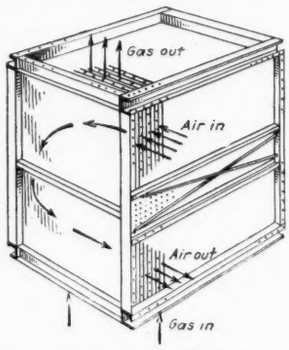
To keep corrosion at a minimum, copper spray coils with tobin bronze nozzles are used, and the plate construction is of a highly acid-resisting metal, the whole being protected by several coats of preserving paint.

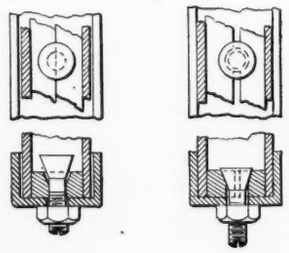
American Smoke & Soot Washer Company, Inc., 55 West 42d St., New York City. May 6, page 726.

Air Heater Without Welded Joints

Thermix Type C air heater, developed primarily for gas temperatures above 1,000 deg., incorporates the important feature of the Type A, manufactured by the same company, that of utilizing plates directly from the mill without welded joints in the gas and air elements.

In the Type C the plates are secured at the edges by a vise

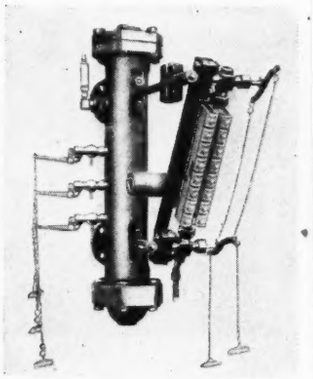




or clamp. The vise is composed of a channel against the inside of the flanges, of which rest the edges of the heater plates. These plates are forced against the channel flanges by two parallel bars, which, in turn, are forced apart by the shoulders of special bolts at 4-in. intervals. The bolts fit in

countersunk openings between the bars and are tightened by nuts on the outside of the channels.

Prat-Daniel Corporation, 183 Madison Ave., New York City. Jan. 27, 1931, page 159.



High-Pressure Water Gage

In the "Micasight" water gage, glass is eliminated entirely, mica only being used. The body is made from steel, with the steam and water space closed on each side by a thin sheet of mica held in position by a bronze cover plate, which, in turn, is secured in position by a series of short clamps and studs. A special illuminator is attached at the back of the glass. The gage is designed for a working pressure of 2,000 pounds.

Reliance Gauge Column Company, Cleveland, Ohio. Jan. 27, 1931, page 160.

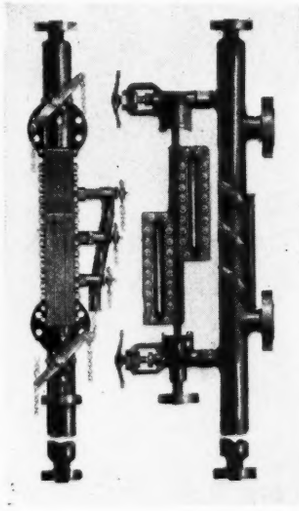
High-Pressure Gage Glass and Water Column

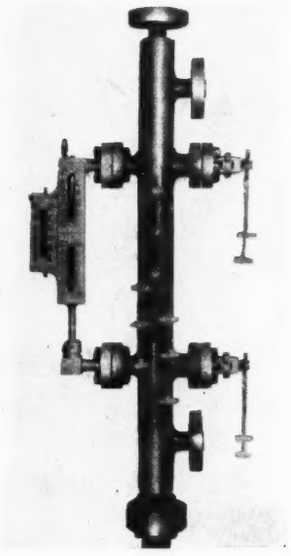
Loose - window construction features this high - pressure (1,500 lb.) gage glass and water column.

The glass is virtually loose, acting only as a support for a thin mica strip clamped between the flanges at each side. As there is actually no clamping tension exerted on the glass, it is not subjected to any greater pressure than the steam pressure itself. This construction relieves the glass of any stress due to the wide difference in expansion between the metal and the glass.

The water column to which the gage is attached is made with all-flanged connections and fitted with forged-steel valve bodies, renewable valve seats of stainless steel, self-aligning valve disks of Monel Metal, and valve stems of the same metal with threads external to the valve body.

Diamond Power Specialty Corporation, Detroit, Mich. June 24, page 1004.





Water Column and Gage Glass for 1,800 Lb. Pressure

In contrast with the usual design, the shut-off valves in this water column, designed to operate at 1,800 lb. pressure, are mounted in the column instead of directly in the gage connection. The water gage comprises three flat-glass sections each protected by mica and mounted in a forged-steel housing, fitted with an expansion joint at the lower end. The shut-off valves have renewable chromium-steel seats and disks and are of the outside screw-and-yoke type. The water gage housing is fitted with an eyebolt to facilitate handling. Three try-cocks of special design for high-pressure service are mounted in the side of the column.

Reliance Gauge Column Company, Cleveland, Ohio. Aug. 5, page 230.

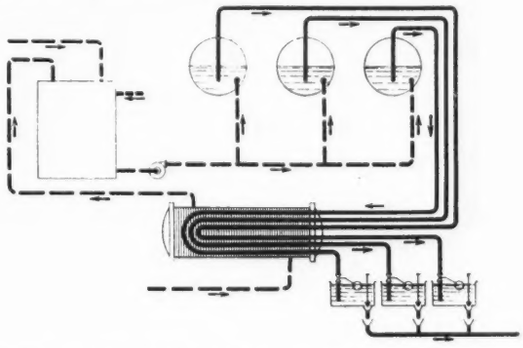
Continuous Boiler Blowoff System

The function of this continuous blowoff system is to provide an automatic means of controlling the concentration in each boiler and recovering the useful heat contained in the blowoff liquid. Numerous system arrangements are available to meet various operating conditions. The one illustrated is used where there is insufficient waste exhaust steam to raise the temperature of the feed water to the boiling point in the open heater. This arrangement provides for automatic control of the blowoff from each individual boiler. It also permits the operator to determine immediately the condition of the salines discharged from any boiler at any time and to regulate the flow from each boiler accordingly. The blowoff line from each boiler connects to one of these compartments and a separate control box is used on the discharge of each compartment.

Where there is sufficient exhaust steam available to heat the feed-water to the boiling point in the open heater a heat exchanger is placed on the discharge side of the boiler feed pump. In this arrangement the blowoff lines are combined in a single header and passed through the heat exchangers in a single stream.

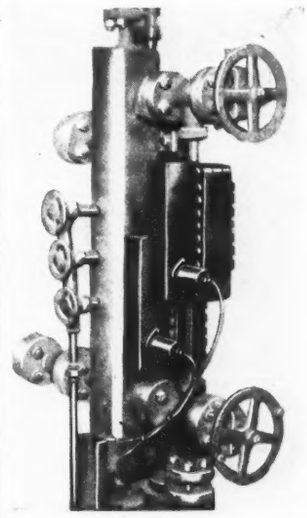
Control of the rate of blowoff is accomplished by a special rate-of-flow controller.

Permutit Company, 440 Fourth Ave., New York City. Dec. 16, page 987.



Illuminator for High-Pressure Water Columns

In this improved Type L illuminator for high - pressure water columns using the flat glass bolted into heavy casting, light from a standard 150-watt lamp is directed upward by a chromium-plated parabolic mirror set at an angle of 45 deg. A series of metal louvres prevents the passage of light at any other angle, so that no stray light escapes. The upward beam

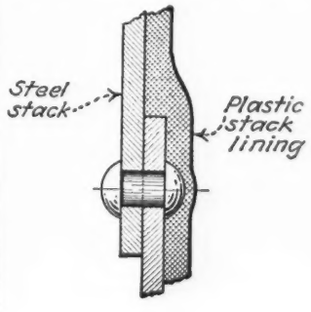


is totally reflected by the under side of the surface of the water, causing a brilliant spot of light. The rest of the gage glass remains in darkness. The contrast of the brilliant meniscus against the unlighted background makes the water level easily visible from a considerable distance.

National Company, Inc., 61 Sherman St., Malden, Mass. April 22, page 646.

Plastic Lining for Steel Stacks

Among the claims made for this plastic lining for steel stacks are that it adheres directly to the metal and forms a continuous jointless lining. It dries throughout to a dense, tough, adhesive and cohesive mass which meets the expansion, contraction and flexing of the metal. It is further claimed that, by reason of its intimate



contact with the sheet, greater protection against corrosion is offered than is realized with the standard form of brick lining.

Chessman - Elliot Company, Inc., 639 Kent Ave., Brooklyn, N. Y. Aug. 5, page 229.

Continuous-Blowdown Heat-Reclaimer System

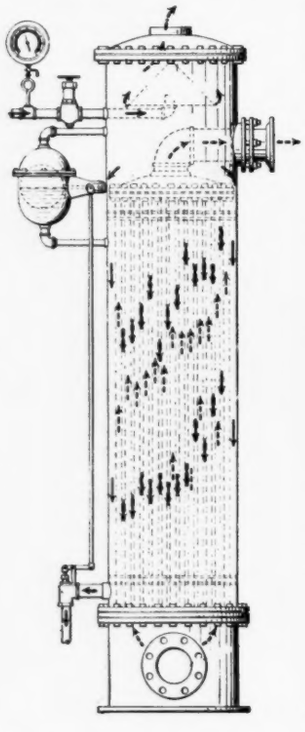
In this continuous-blowdown heat-reclaimer system the blowdown water is regulated to pass through a heat reclaimer, where the cold make-up takes up practically all of the available heat. Three types have been designed, flash, single-stage and two-stage.

In the flash type the blowdown water passes into a low-pressure flash chamber at the upper end of a vertical heat reclaimer. Here a portion of the blowdown flashes into vapor and may be used for low-pressure heating or be returned to the feed-water heater or low-pressure system as pure vapor. The heat reclaimer is practically identical in construction with a closed feed-water heater in which a special floating head is used to take care of the expansion incident to wide changes in temperature. Tubes are straight, and the tube nest may be removed by lifting the outer shell from its base. The flash type of unit is recommended for plants having a deficiency of exhaust steam or where the heater temperature cannot be maintained over 200 deg. F. without the use of live steam.

Where the supply of exhaust steam is plentiful the single-stage reclaimer is employed. It is of high-pressure construction and is installed between the feed-water heater and the boiler, where it serves as an economizer.

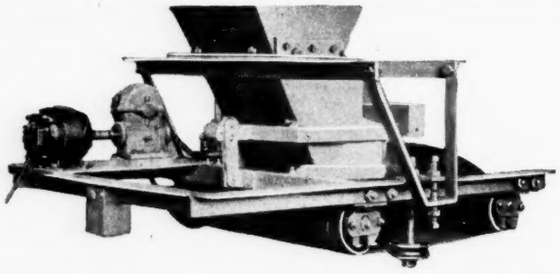
The two-stage system consists of two heat-exchange units without flash chambers. It is used where exhaust steam is deficient about half the time. With this installation the advantages of the single-stage reclaimer are maintained and in addition the temperature of the feed water going to the heater is increased several degrees. The first- and second-stage units are similar in construction and usually are interchangeable. If desired, either stage may be operated independently of the other.

National Aluminate Corporation, Chicago, Ill. Sept. 16, page 474.



Coal- Ash-Handling Equipment

Standardized drives for bucket elevators and screw conveyors, single-roll coal crushers automatic coal sampler, hydro-vacuum and pneumatic ash-handling systems.



Constant-Weight Feeder for Coal and Dry Materials

Both coarse and fine feeds are regulated by weight with this feeder for pulverizing mills, kilns, dryers and similar equipment. It automatically maintain the weight constant regardless of changes in conditions due to bin segregation, nature of material or entrained moisture.

A short traveling belt attached to a frame, on which the driving mechanism is located, is suspended on two pivoted points so that any variation in the weight on the belt will move the frame either up or down, which, in turn, opens or closes the feed gate a sufficient amount to bring the weight back to that originally set. The quantity of feed is controlled by a balancing weight on a lever extended from the gate.

The driving unit, consisting of a small motor and speed reducer, is mounted on the same frame as the traveling belt, the whole being suspended from the bottom of the overhead bunker or supply bin.

By a remote-control device the feed may be varied from any point distant from the feeder itself. Synchronizing mechanism may also be employed to any two or more feeders. A number of sizes are available.

Hardinge Company, 122 East 42d St., New York City. March 25, page 490.

Drag-Type Flight Conveyors

The boom of Model 55 flight conveyor is sectional in construction, and the machine may be had in boom lengths of 24 30 and 39 ft. Flights are deep and cupped to enable them to exert a digging action, and the chain of the flight line is constructed with specially wide wearing surfaces. The truck is built with swivel wheels and is powered by either an 8-hp. LeRoi gasoline engine or an 1,800-r.p.m. electric motor. The power unit is so mounted that it remains vertical regardless of the angle at which the truck may be operating.

The conveyor, which has a capacity of a ton of coal a minute, is equipped with a power boom hoist of the self-locking worm type, which is engaged by means of a hand lever near the power unit.

Barber - Greene Company, Aurora, Ill. May 20, page 800.

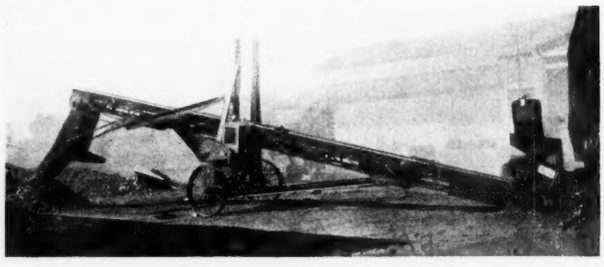
Flight Conveyor With Sectional Truss Boom

Equipped with sectional truss boom, swiveling wheels and finger-tip-control power boom hoist, Model 65 flight conveyor is available in three boom lengths, 20, 25 and 30 ft., and is built in sections so that a 20-ft. boom machine may be converted into a 25- or 30-ft. machine, or vice versa. It is powered with a 5-hp. ball-bearing motor. The trough of the boom is made wide and deep, and the flights are of special pressed steel, reinforced and fastened to the flight chain with swivel attachment links which prevent strain or breaking if the flights get out of alignment.

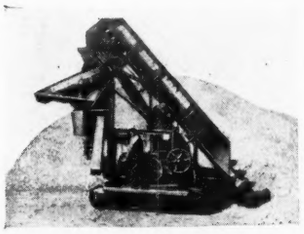
Barber - Greene Company, Aurora, Ill. Jan. 20, 1931, page 120.

High Capacity Crawler Loader

Equipped with a self-feeder of the continuous helical ribbon type, which feeds and cleans up uniformly, this crawler bucket loader has a rated capacity of 1¾ cu.yd. per minute, handling run-of-mine coal, coke, etc. The action of the self-sharpening spiral and cutting edge serves to cut, dig and convey material to the elevator buckets in a smooth, uniform stream. Adjustment is controlled by a handwheel within easy reach of the operator.



The regular power unit in-



cludes a 30-hp. gasoline engine or a 20-hp. electric motor for operating the bucket, elevator, feeder and crawler traveling mechanism. The crawler is wide and long to give stability, and the frames are one-piece steel castings.

Link-Belt Company, 910 South Michigan Ave., Chicago, Ill. June 17, page 963

Automatic Loader for Skip Hoists

In the automatic loader known as full-bucket control, a simple attachment, consisting of a swinging plate, is so arranged that unless material is flowing through the chute in sufficient depth to maintain electrical contact, the skip hoist will not operate.

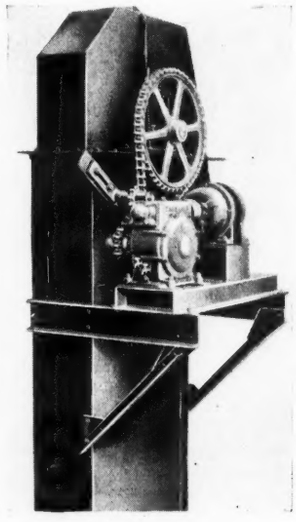
When the bucket reaches the loading position this loader permits the material to flow from the hopper until the bucket is full. Then the mechanism causes the bucket to be hoisted, thereby moving the loader into its closed position, where it remains as the bucket continues to travel to the emptying point and until it returns to the loading position, where it is again automatically loaded. The bucket continues to load and empty automatically as long as there is sufficient material to fill it.

Link-Belt Company, 910 South Michigan Ave., Chicago, Ill. April 1, page 528.

Standardized Drive for Bucket Elevators

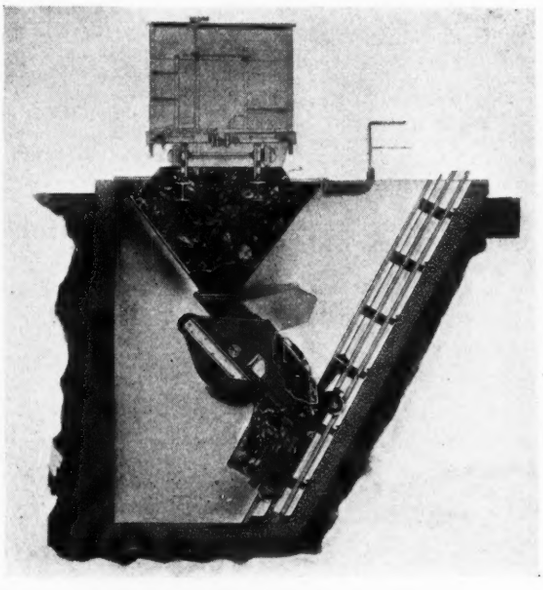
In this standardized drive for bucket elevators a wide range of ratios from 3 to 15 hp. are available, making the unit suitable for practically any elevator installation.

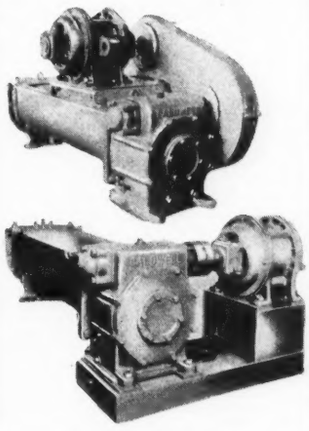
The first reduction of the drive is made up of a fully inclosed worm-gear speed reducer to which a standard motor is connected through a flexible coupling. The second reduction is made by a roller chain. The latter drive, in addition to providing a flexible connection between the driving unit and the elevator head shaft, makes possible reasonable speed changes.



Anti-friction bearings with splash lubrication, hardened and ground steel worm with bronze worm gear are used in the speed reducer.

H. W. Caldwell & Son Company, division of the Link-Belt Company, Chicago, Ill. April 8, page 566.





Standardized Drives for Screw Conveyors

Made in two sizes, C and D, these standardized drives for screw conveyors are suitable for conveyors from 8 to 16 in. in diameter. Type C drive consists of a silent chain fully inclosed in an oil-retaining steel casing, and a worm-gear speed reducer designed to serve as a thrust-end and screw conveyor drive. Type D drive consists of a direct-coupled reducer, mounted with its motor on a unit baseplate.

The drives are adaptable to horizontal or inclined conveyors, with proper adjustment of the oil level. Standard motors of 860 or 1,160 r.p.m. (60 cycle), and 710 or 1,430 r.p.m. (25 cycle) can be accommodated on these conveyor drives.

H. W. Caldwell & Son Co., division of the Link-Belt Company, Chicago, Ill. May 6, page 724.

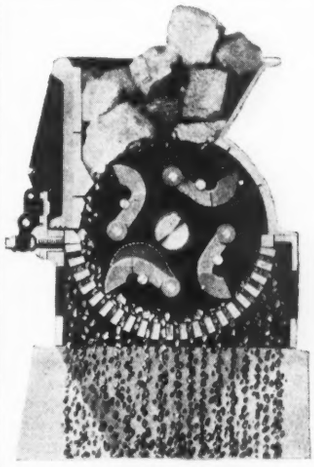
Crawler-Mounted Flight Conveyor

Built in three boom lengths of 24, 30 and 39 ft., Model 57 conveyor has a three-unit chain drive. Each chain unit is of a fixed length, and chain tension does not vary with change in the boom's position. Protection against strains is provided by an overload release sprocket mounted on the head shaft. The inner part of the sprocket is held in normal driving position by two springs. When an overload occurs on the flight line, the spring compresses, allowing the driving part to turn freely until the overload is relieved. Flights are of ¼-in. steel and are cupped to exert a digging action. Capacity is rated at one ton of coal a minute.

Barber - Greene Company, Aurora, Ill. June 10, page 922.

New-Design Single-Roll Coal Crusher

The "Flextooth" coal crusher is designed to produce smaller uniform sizes of coal than are



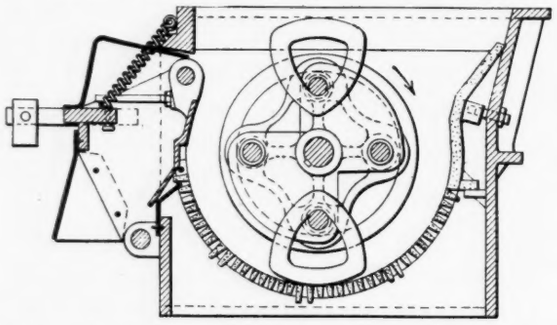
readily obtained with the standard roll crusher. It is available in seven sizes ranging from 20x12 to 42x48 inches.

The crushing element consists of a roll equipped with hinged teeth which are kept in the outward position by centrifugal force, but are free to swing back below the surface of the roll should foreign matter be encountered. Capacities of the smaller size are 25 tons per hour of 2-in. product and 5 tons of ¼-in. product; in the larger size 350 tons of 2-in. and 90 tons of ¼-in. product are obtainable. Sizes between these two have corresponding capacities. A hinged breaker plate allows access to all working parts.

Jeffrey Manufacturing Company, Columbus, Ohio. Dec. 2, page 907.

Two-Sector Coal Crusher

Among the claims made for this two-sector type coal crusher are high capacity, low power consumption, and small size per unit of output. The machine,



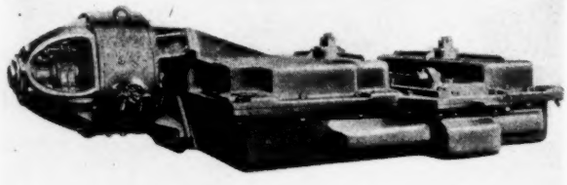
which is of all-steel construction, has unusually low over-all height for a given capacity of 120 tons an hour, being only 25½ in. high. The crushing element consists of two rows of triangular-shaped manganese-steel sectors mounted diametrically opposite on a spider.

The unit is equipped with a spring-loaded apron which permits the tramp iron contained in the coal to be discharged without damage to the machine. Units are available with a number of different grinding arrangements and in a number of sizes, ranging in capacities from 10 to 800 tons an hour on bituminous coal.

A. A. Crusher & Pulverizer Company, 136 Liberty St., New York City. July 1, page 38.

Shaker Conveyor Drive

The mechanism of the C20 drive for shaker conveyors consists of a gear train and crosshead which convert the rotary motion of the motor into reciprocating motion of a crosshead connected to the conveyor trough. The mechanism is totally inclosed in a cast-steel

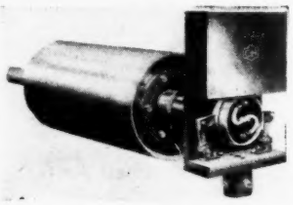


case, which also serves as an oil reservoir. The driving motor is rated at 20 hp., and automatic remote control with time-limit acceleration and full protection against overload and undervoltage is provided. Lubrication of the various bearings is by an oil pump located in the case and driven by an eccentric on the primary drive shaft. The maximum length of the stroke is 11 in., and fourteen different strokes, between 11 in. and zero, are available. Over-all dimensions are, height, 24¾ in.; width, 84½ in.; plus from 20⅞ to 35⅝ in. for the motor; and length, 44 inches.

Conveyor Sales Company, Inc., 299 Broadway, New York City. Jan. 6, 1931, page 44.

Magnetic Separator Pulley

Three major parts — a machined cast-steel spool, magnet coils and a coil shield—with the necessary insulation, constitute the type "W" magnetic separator pulley. The magnet coils are wound on the steel spool and



vacuum-impregnated. The coil shield, of Allegheny metal, is then welded to the spool so that it completely incloses the coils. Heavy brass collector rings and carbon brushes are used. A dustproof cover protects the rings. Pulleys in 12-in. diameter size and in six lengths, for belt widths varying from 12 to 30-in., are available.

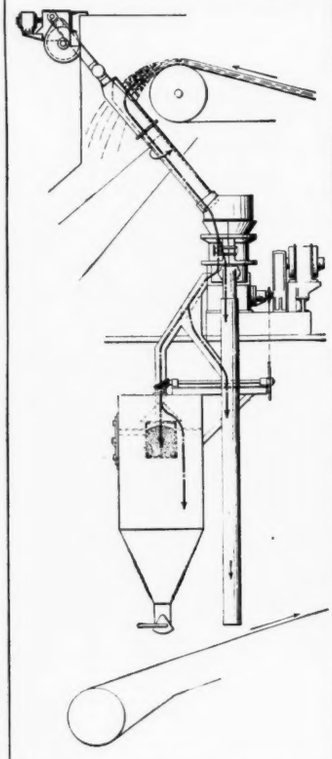
Cutler-Hammer, Inc., 190 12th St., Milwaukee, Wis. Dec. 23, page 1023.

Automatic Coal Sampler

Briefly, this automatic coal-sampling system consists of a primary sampler ahead of the head pulley of a belt conveyor, a motor-driven crusher for crushing the sample to the required fineness, a rotating final sampler and a final-sample bucket.

The primary sampler is a rotating tube placed approximately 90 deg. to the coal stream and having an opening in one side of sufficient length to take the full depth of the coal stream. Samples are secured at predetermined intervals

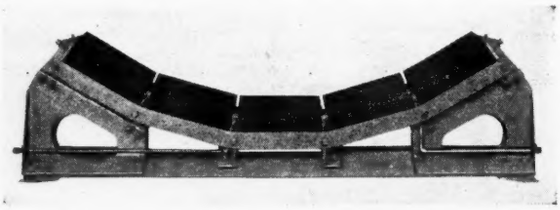
In the crusher the samples are crushed and mixed, and 90 to 95



per cent of the material is discarded through the surplus material spout, the remaining 5 to 10 per cent passing to the final sampler.

The final sampler is located inside an air-tight hopper that receives the surplus material and retains it until the end of the operating period of the conveyor, at which time the bucket is removed from the hopper, sealed and sent to the laboratory for analysis.

Charleroi Iron Works, Charleroi, Pa. Dec. 16, page 987.



Rubber-Cushioned Idler for Belt Conveyors

This rubber-cushioned idler for belt conveyors is designed especially to absorb the shocks of falling chunks of coal, rock, etc., at the point of loading. Steel strips fastened to both sides of the idlers prevent spilled material from banking up against the pulleys and serve as a cleaner to take off any sticky material that may adhere to the pulleys. The end brackets have a hooded shape to protect the end bearings from damage.

Robins Conveying Belt Company, 15 Park Row, New York City. March 11, page 409.

Belt Conveyor Carrier

In this belt conveyor carrier each roller with its bearing is a self-contained unit and can be interchanged with any other

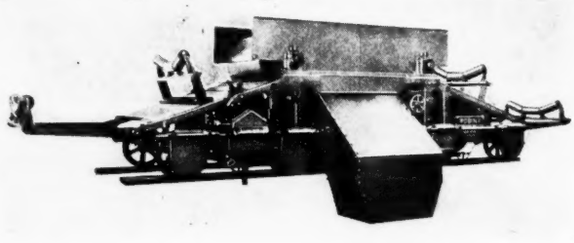
roller without disturbing the bearing adjustment.

Each roller is equipped with two tapered roller bearings especially housed and protected from dust and moisture by an intermeshing labyrinth grease seal. The bearings are large in size and are arranged to carry both end thrust and radial loads. The carrier is built in sizes from 18 to 48 in. wide.

Stephens-Adamson Manufacturing Company, Aurora, Ill. Dec. 2, page 908.

Reversible Tripper

The illustration shows a 36-in. double, reversible tripper for a belt conveyor arranged to dis-



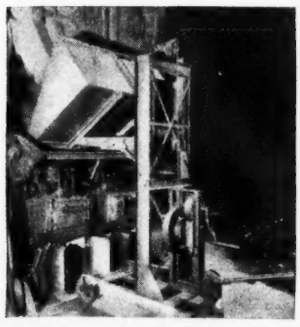
charge from either side. It consists of two standard types heavy-duty trippers equipped with roller bearing idlers and arranged to operate from a single drive.

Robins Conveying Belt Company, 15 Park Row, New York City. March 18, page 450.

Stacker Elevates Coal to Stoker Hopper

Where no overhead coal bunkers or other mechanical equipment is installed to transfer the coal from point of unloading to the stoker hopper this stacker can be used to advantage.

Used as a truck, the stacker is drawn from the coal pile over



a scale for weighing and then to a position in front of the stoker. In the unit shown the lifting and dumping are done by a hand-powered winch. Motor-operated units are also available.

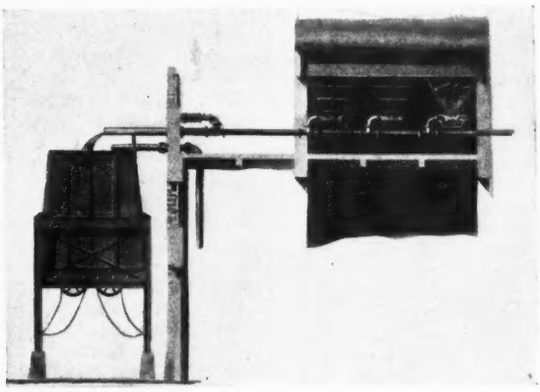
Lewis-Shepard Company, Watertown, Mass. Jan. 6, 1931, page 45.

Car-Pulling Unit

Built in three sizes to handle from one to six 80-ton cars, this electrically operated capstan car puller is self-contained, weatherproof and designed to pull cars,

trucks, etc., at any angle. The motor and gear-reduction drive for the winding drum are assembled as a unit on a heavy overall bedplate.

Webster & Weller Manufacturing Companies, 1856 North Kostner Ave., Chicago, Ill. Jan. 27, 1931, page 162.



Hydro-Vacuum System for Fly Ash and Sifting

With this hydro-vacuum system dust and soot are removed from the last pass of boiler settings, economizers, air heaters, dust collectors, etc., in a dry condition through an air-swept valve bolted to the bottom of the dust-collection hopper, the dust being thoroughly mixed with water and discharged by a "Hydrovactor," or ejector.

Vacuum necessary to draw the air through the valve and entrain the siftings is produced by a hydraulic ejector. After leaving the ejector the dust-laden water is piped to point of disposal.

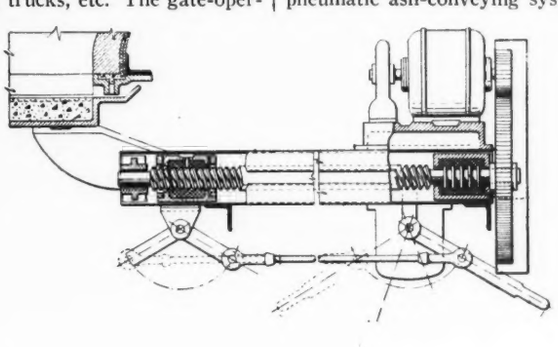
Among the claims made for this system are: It is dust- and water-tight, assuring cleanliness in operation; ejector can be installed in any position and will elevate the dust-laden air as required for disposal into an overhead bin; operation is entirely automatic. Also, it is impossible to overload or dam the system, since the vacuum produced in the air-swept valve is directly proportional to the quantity and velocity of the water in the ejector.

Allen-Sherman-Hoff Company, 219 South 15th St., Philadelphia, Pa. Sept. 16, page 473.

Screw-Drive Ash-Hopper Gate

Made in underslung and straight-away types, this electric screw drive gate is suitable for use on ash hoppers, small ash cars, trucks, etc. The gate-operating screw is driven through spur gears by a fully inclosed high-torque motor equipped with magnetic brake. A cast-steel babbitted nut actuated by the driving screw moves the gate as required. To insure sufficient impact to start the gate under all conditions of load a gap is provided between the traveling nut and nut housing to permit the drive screw to come up to practically running speed before coming in contact with the nut housing. The end thrust of the screw is taken by a five-ring babbitted thrust bearing.

Beaumont Manufacturing Company, 319 Arch St., Philadelphia, Pa. Dec. 16, page 988.

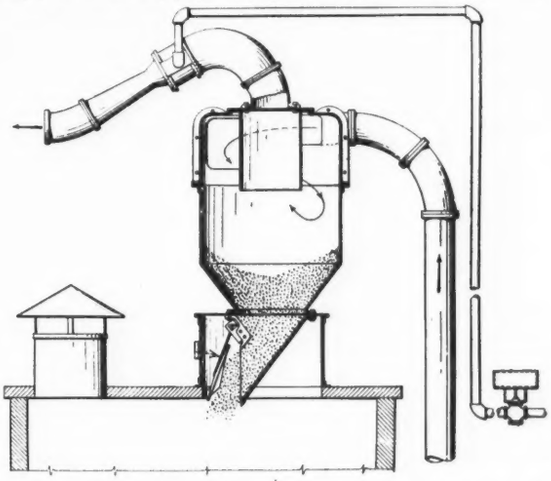


Pneumatic Ash-Conveying System

Basic features characterizing the operation of the "Nuveyor" pneumatic ash-conveying system are: No steam comes in contact with the ashes, and, as the ashes are delivered dry to the storage tank, they will not freeze or pack, and will discharge freely by gravity. High capacity and low steam consumption is obtained by the use of a Venturi tube, multi-steam jet exhauster. A special receiver does away with the need for an airtight storage tank. A washer and silencer eliminate all dust and noise.

The system consists of four units, conveyor pipe line, a receiver that collects and automatically discharges the conveyed material to the storage tank, a multi-steam-jet exhauster (which, if desired, may be replaced by a centrifugal fan or a rotary positive blower), and a combination washer and silencer.

Pushing a switch button located near each ash intake starts the timer motor, which opens and closes the steam valve to the multi-jet exhauster. The exhauster draws the air out of the receiver, and the inrush of air through the receiver discharge gate, which hangs open when the equipment is not in operation, swings the gate to the closed position, and the partial vacuum created in the



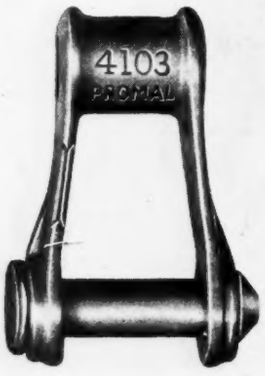
receiver holds it closed. A high-velocity current of air is then drawn through the conveyor line, carrying with it, to the receiver, ash fed in at the intakes.

Steam remains on for about 80 sec., whereupon the motor automatically closes the steam valve and holds it closed for about 5 sec. This shuts off the exhauster and breaks the receiver vacuum, which allows the discharge gate of the receiver to swing open by gravity and dump the ashes. Operating and dumping intervals can be altered to meet any conditions. Capacities range from 5 to 30 tons an hour.

United Conveyor Corporation, Old Colony Building, Chicago, Ill. June 3, page 884.

New Metal for Chains

Great toughness to resist extreme tension without permanent stretch; high strength in proportion to weight and size; and hardness that affords great resistance to abrasive wear are some of the features



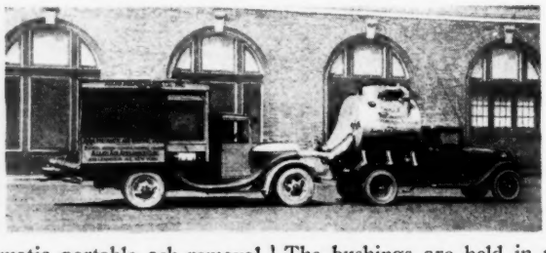
claimed for this "Promal" chain. In addition to having a high yield point the metal is tough and ductile, so that it withstands shock and fatigue loads. High temperature reduces its tensile properties somewhat, but temperatures up to 1,000 deg. F. will not cause it to become brittle.

Promal chains are recommended for chain drives, elevators and conveyors operating under gritty or abrasive conditions; chain drives where greater strength is required than is possible with the corresponding size of malleable-iron chain; drag, scraper, and flight conveyors where the chain drags and is subject to abrasion; heavy-duty drives of comparatively high speed, short centers and large sprocket ratios.

Link-Belt Company, 910 South Michigan Ave., Chicago, Ill. July 22, page 152.

Portable Pneumatic Ash-Removal System

Dustless and noiseless removal of ashes from the smaller plants, basements of offices and public buildings is possible with this



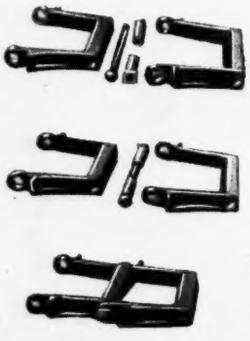
pneumatic portable ash-removal system consisting of two units, a dump unit carrying an air-tight steel ash container, and a power unit carrying a suction producing apparatus. The two are temporarily connected only while ashes are being drawn from the basement into the dump unit.

The power plant comprises a 75-hp. Continental gasoline engine driving a multi-stage vacuum producer, together with two large dust filters, the complete assembly being mounted on a truck. This unit is used to produce a vacuum in the closed ash tank, causing the ashes to be drawn into it. Where the system is used permanently a pipe line is installed extending from the ashpit in the boiler room to the sidewalk. A flexible hose is then used to connect to the dump unit.

Allen Air Appliance Company, Inc., 452 Lexington Ave., New York City. Oct. 28, page 700.

Improved Conveyor Chain

The links of this conveyor or drag chain for handling refuse or other material are made from manganese steel. Instead of the



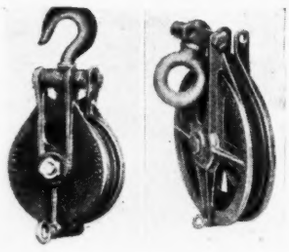
usual steel pin or rivet running clear through the body of the link, each link is supplied with two manganese steel bushings, one for each eye of the link. This bushing arrangement enlarges the bearing surface and does away with the bowing and distorting common to the regular steel pins, and eliminates the trouble in removing or replacing the pins when worn. The bushings are held in place by a steel pin.

American Manganese Steel Company, Chicago Heights, Ill. Feb. 4, page 192.

Improved Dragline Blocks

These steel dragline blocks are built of special heat-treated alloy steel combining high strength with light weight. The flange of the sheave is protected by a heavy head on the housing that tends to prevent fouling and protects the cable. The block can be opened up to receive or remove the cable by removing one pin from the yoke.

The blocks are furnished with either bronze-bushed or roller bearings, and with swivel hook,

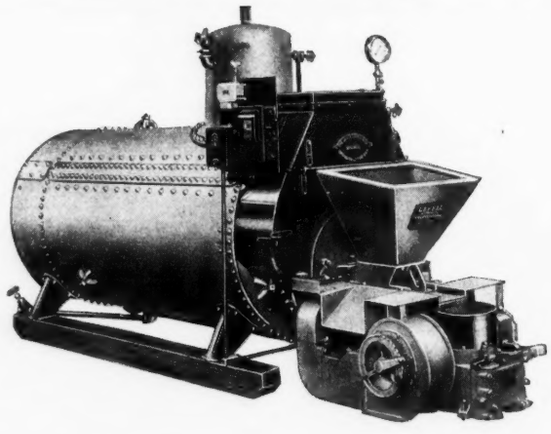


swivel rope bearing eye, or swivel pin eye attachments.

Sauerman Brothers, 438 South Clinton St., Chicago, Ill. Nov. 11, page 774.

Fuel-Burning Equipment

Recent developments in the fuel-combustion field are stoker units designed especially for the Scotch marine-type boiler, low-set stokers for firebox boilers either of the all-steel or cast-iron types, stokers of the revolving blade type adaptable to any shaking grate already installed and coal pulverizers with more efficient grinding elements, as well as improved pulverized-coal and oil burners.



Underfeed Stoker for Scotch Marine Type Boilers

This automatic underfeed stoker, designed especially for Scotch marine boilers, is made in sizes suitable for units ranging from 150 to 2,000 sq.ft. of heating surface, and can as readily be applied to existing as to new installations.

The various parts of the stoker are combined to form a complete assembly, which is placed in front of, and made to rest on, the same level as the boiler itself. The forced-draft fan is directly connected to the driving motor, with the reduction gear for the stoker ram drive in the center. Automatic control of the complete unit is effected by a pressure-switch mounted beside the combined starter and safety switch on the boiler smokebox.

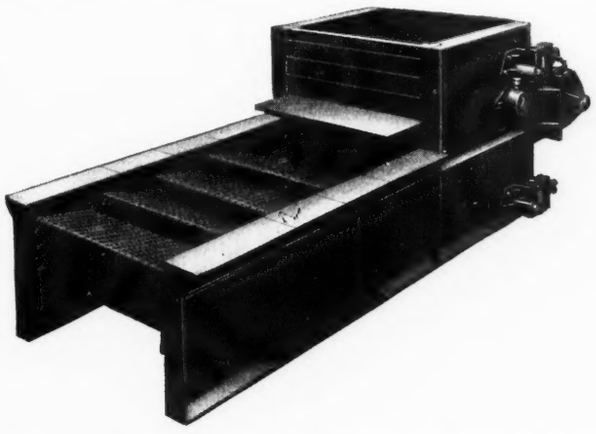
Although the motor drive, with complete electric control, is standard equipment, steam-turbine drive can be furnished to meet certain installation requirements or where current is not available.

James Leffel & Company, Springfield, Ohio. April 1, page 527.

Stoker for Firebox Boilers

As in the earlier design, this Model C low-set stoker, adaptable to firebox boilers, either of the all-steel or cast-iron type, is made up of four grate sections, each having a number of grate bars to provide air space. The feed plate is a combustion section, as it forms the bottom of the coal hopper as well as the first of the four grate sections.

The movable sections, which are supported on roller bearings, have a reciprocating action that feeds the coal from the hopper and advances the fuel bed. The movement of the grate is adjustable from 1 to 4 in. Motive power is furnished by a



motor mounted on the front door of the stoker, together with a fan and a reducing gear.

Model C stoker is only 14 in. from the floor to the top of the ledge, making it possible to put it under firebox boilers set in their usual low position.

Whiting Corporation, Harvey, Ill. July 15, page 113.

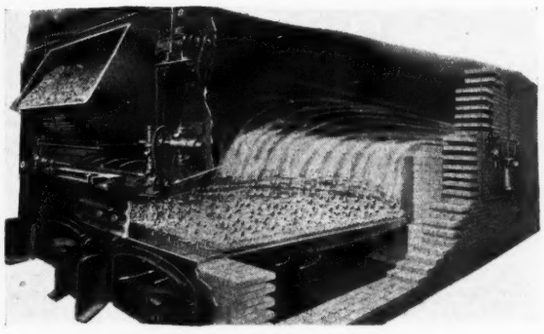
Automatic Stoker of the Revolving-Blade Type

Although especially adaptable to Dutch oven settings, this automatic coal feeder, of the revolving-blade type, may be adapted to any shaking grate already installed or provided as an integral part of the stoker. Coal is shoveled into a hopper from which it is fed by gravity to a pusher box. The pusher receives its motion from an eccentric on the main shaft, which functions through a tapered wedge or arm on the cross shaft that imparts the motion to the pusher.

Although the stroke of the eccentric rod is constant, a varying stroke is imparted to the pusher to meet changing demands for fuel through the medium of a steam pressure regulator which raises or lowers the wedge. This action changes the point of contact of the eccentric rod and thus varies its effective stroke.

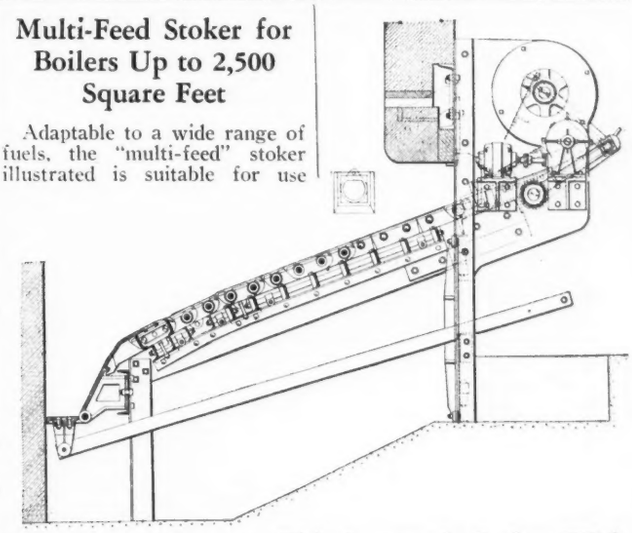
Coal is passed by the pusher into a housing below the hopper, and from that point is distributed over the entire grate surface by an adjustable reel fitted with four rows of blades. The reel is formed by four blade shafts spaced 90 deg. apart on a circle concentric to the main stoker shaft. On each shaft the angle of the blades varies, so that each blade serves a particular area of the grate. The drive is an adjustable-speed ½-hp. motor connected through roller chains to the main shaft, which, in turn, drives the reel shaft on one side of the coal hopper, and on the other side drives the pusher box shaft. The speed of the main shaft is 110 r.p.m. and that of the reel shaft about 300 revolutions per minute. Full-size firing doors are also provided.

Chicago Automatic Stoker Corporation, 1217 West Monroe St., Chicago. May 20, page 800.



Multi-Feed Stoker for Boilers Up to 2,500 Square Feet

Adaptable to a wide range of fuels, the "multi-feed" stoker illustrated is suitable for use



with boilers ranging from 750 to 2,500 sq.ft. of heating surface.

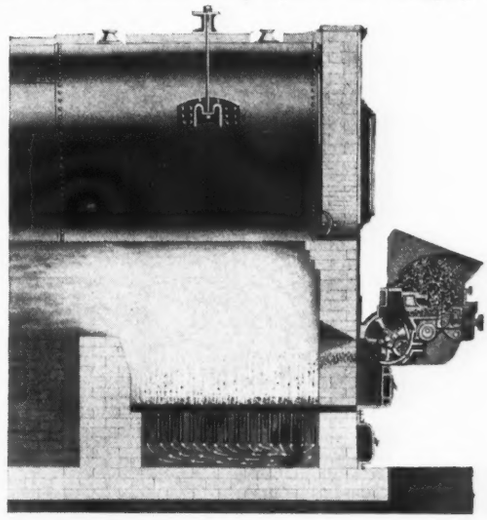
The grate surface, which is flat and slightly inclined, is made up of moving grates and stationary grates, the stationary sections comprising about 35 per cent of the entire grate area. Coal is fed on to the grate by pusher plates operated by a rack and pinion. The pusher plates are attached to the moving section of the grate, and the amount of back-and-forth movement is readily adjustable.

At the rear end of the grate a stationary housing, or section, is provided, its purpose being to delay the discharge of the ash and thereby reduce its combustible content. This stationary section also tends to retard the forward movement of the coal and to give a more compact fuel bed. A 13-in. front flat arch, or wall support, with overfire ventilation, is furnished as a standard part of the stoker. The drive, consisting of a small motor directly connected to a worm-gear reduction unit, is mounted at one end of the hopper.

Johnston & Jennings Company, 877 Addison Road, Cleveland, Ohio. July 8, page 72.

Automatic Stoker With Revolving-Type Distributor

Suitable for installation with firebox, fire-tube, water-tube and Scotch marine boilers, in sizes ranging from 500 to 10,000 sq.ft. of heating surface, this stoker has no moving parts inside the combustion chamber, the entire stoker-operating mechanism being mounted directly on the boiler front. Coal feeds by gravity from the hopper to a reciprocating feedplate which discharges it to a curved adjustable throatpiece, where it is picked up by revolving distributor blades and spread over the entire grate surface. The speed of the distributor blades is constant, and the only adjustment required for changing loads is



the stroke of the feedplate. This is effected by a small handwheel at the front. Adjustment can be made for coal feeds from 1 to 60 lb. of coal per square foot per hour. The distributor blade shaft bearings which are exposed to the radiant heat of the furnace are water-cooled.

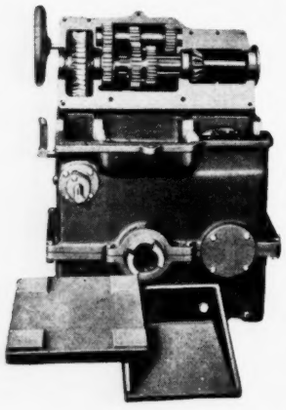
The tuyère plates are of spe-

cial design, and the air in passing through is preheated and injected into the fuel bed through angularly placed openings, causing a criss-crossing of air jets and effecting a thorough mixing of the air and gases. Forced draft is supplied beneath the grate by a slow-speed direct-connected, motor-driven blower at the side of the furnace.

Hoffman Combustion Engineering Corporation, Ford Building, Detroit, Mich. Jan. 13, 1931, page 81.

Speed Reducer for Stoker Drive

In this three-speed reducer, developed especially for automatic stoker drive, change of speeds is accomplished by a handwheel operating a threaded



shaft, upon which the shifting fork is mounted.

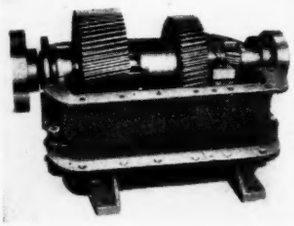
The change gearbox has a splined shaft which is an extension of the worm gear shaft and is mounted on two sets of roller bearings, and also a jackshaft upon which two sets of change gears are mounted. The sliding gears on the splined shaft engage either one of the change gears, or, by means of a clutch, engage the gear mounted on the worm-gear shaft.

Gears & Forgings, Inc., Cleveland, Ohio. Feb. 11, page 227.

Two-Speed Gear Unit for Stoker Drive

Stoker operation at two different speeds is provided by this double-reduction gear unit. In a three-section case, the high-speed pinion shaft and a splined shaft, on which the change gear arrangement is assembled, are aligned directly above the shaft, on which are the intermediate gear and two slow-speed pinions each having a different number of teeth. Slow-speed pinions are integral with the shaft.

Two gears of different size on the low-speed shaft are mounted on roller bearings. Between them a sliding clutch manipulated by a lever from the outside of the case engages either of the gears. Anti-fric-



tion bearings and helical gears are used throughout, the gears and bearings being lubricated by a splash system. The unit has a ratio of 5.88 to 1 in the high speed and 12 to 1 in the low speed.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. April 1, page 529.

Improved Vertical Coal Pulverizer

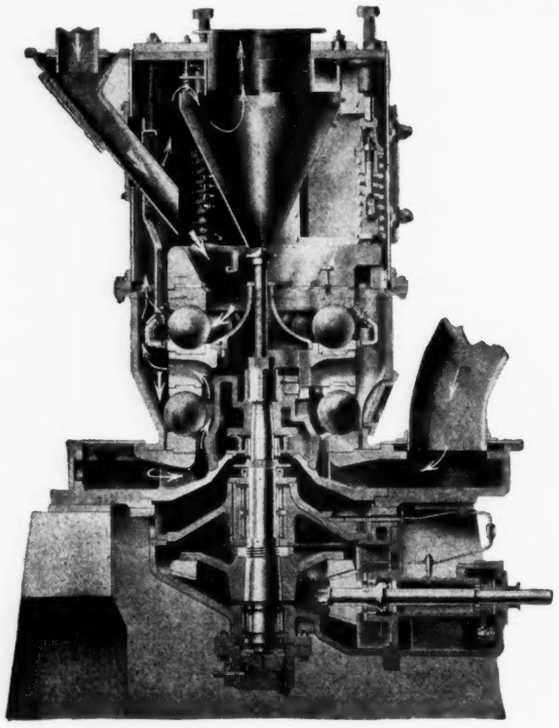
Although embodying the spherical ball and grinding ring principle of pulverizing used in the standard Lehigh mill, Type B has two rows of balls instead of one, and one rotating and two stationary grinding rings. The two rows of balls, one row mounted above the other, are separated and propelled by a rotating ring, which is driven by, and floats on, the main driving shaft. The pressure between the balls and the rings is applied and kept uniform by externally controlled steel springs.

The main driving shaft runs in two roller bearings and is supported at the lower end by a heavy-duty thrust bearing. The bearings and complete driving gear are effectively protected against dust by an air-pressure seal and a throw ring mounted on the shaft above the upper shaft bearing.

After being ground in the upper row of balls it passes through the annular opening formed by the intermediate grinding rings and the coal basket. Any foreign material, such as tramp iron, pyrites and rock, is discharged by the balls to the coal basket. Upon passing through the opening the coarser particles drop to the lower row of grinding balls for further pulverizing, while the finer particles are entrained by the air stream.

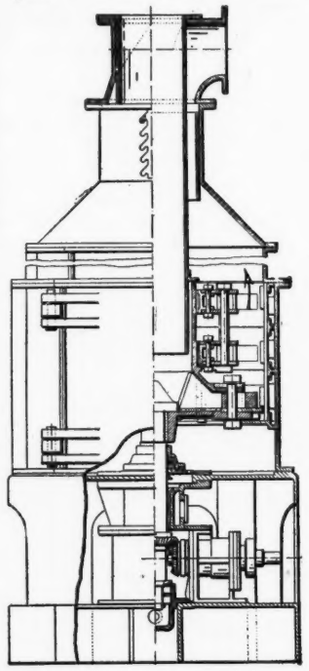
The separating air moves upward inside and through the lower row of balls, then outward through the cored holes in the intermediate grinding ring. These changes in direction of the air stream tend to cause the coarse particles to readily separate from the fine. Separation is further assisted by an adjustable sleeve at the discharge of the mill. The mill is especially well adapted to the use of preheated air as a separating medium and it can be operated either as a pressure or suction mill, as best meets the requirements of the installation. The unit is available in capacities up to and including 40 tons of coal an hour.

Fuller Lehigh Company, Fullerton, Pa. Nov. 4, page 738.



Vertical Multi-Stage Pulverizer

Accessibility for the replacement of wearing parts is an important feature of the "Uniflo" pulverizer. It is possible to replace the entire set of ham-



mers or casing liners through two hinged doors on the side of the casing. The mill consists of a circular steel casing heavily lined with easily replaceable sectional liners made of alloy steel, inside of which revolve the breakers, arranged in three stages.

The coal reaches the mill from a table-type feeder and enters, mixed with air, into a rotary distributor, which not only leads the material and air to the hammers, but also carries the hammer disk of all the stages.

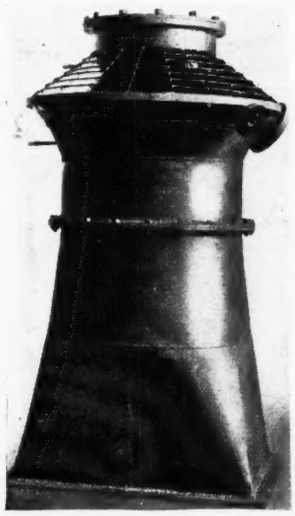
In passing through the mill the coal completes a "U" flow. After passing from the rotary delivery tube to the liner it advances in a spiral movement upward. During this motion centrifugal force and gravity act to separate the heavier particles and return them to the lower stage for further grinding. Final separation of particles takes place in the classifier placed above the hammer stages. An adjustable tube regulates the fineness according to its relative position to the classifier casing. A large throw-out pocket for foreign material is incorporated in the casing.

An independent variable-speed fan is provided with the mill, the use of which facilitates adjustment of the burner, as variable volume and pressure can be obtained.

Heat Utilities Corporation, 5 Beekman St., New York City. Jan. 27, 1931, page 159.

Turbine-Driven Propeller-Type Blower

Rated at 8,500 c.f.m. at 2½-in. water static pressure this forced-draft blower has a three-bladed propeller driven by a single-



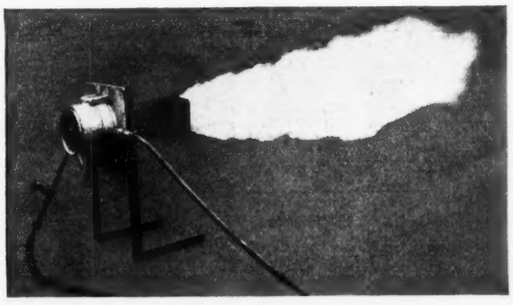
wheel turbine with inside buckets milled in the wheel, through a steel shaft supported in grease-lubricated ball bearings. It may be installed in a horizontal or vertical position, or at any angle, and can be furnished with round, square or rectangular discharge duct.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. July 22, page 154.

Igniter for Pulverized-Coal Fires

Furnishing safe, certain and smooth ignition to pulverized-coal fires and thus eliminating danger of blow-back from slow or retarded ignition is the function of the igniter shown.

In addition to its primary use, that of furnishing ignition, it is particularly suitable for drying out brick settings and getting



up steam before lighting pulverized coal fires. Any desired flame may be obtained by regulating hand valves, and both steam and compressed air may be connected to the same atomizers.

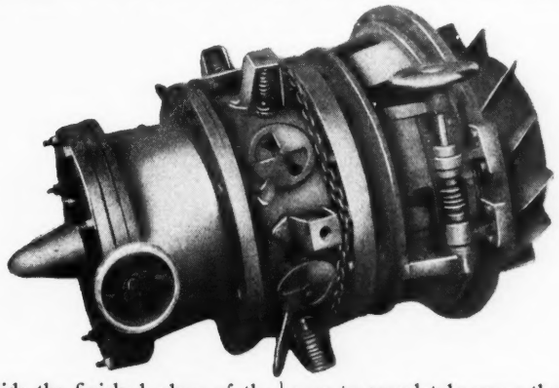
Igniters of this type are being operated on gasoline, kerosene distillate, transformer and switch oil, crankcase drawings from trucks, and waste oil from the power plant in general, and also on 19 Baumé crude.

Schuyler C. Page, 146 Devonshire Court, Rochester, N. Y. Feb. 18, page 266.

Adjustable-Orifice Burner for Pulverized Coal and Gas

A feature of this adjustable-orifice coal and gas burner is the method employed of controlling the velocity at the point of issue from the burner and at the same time maintaining the necessary turbulence.

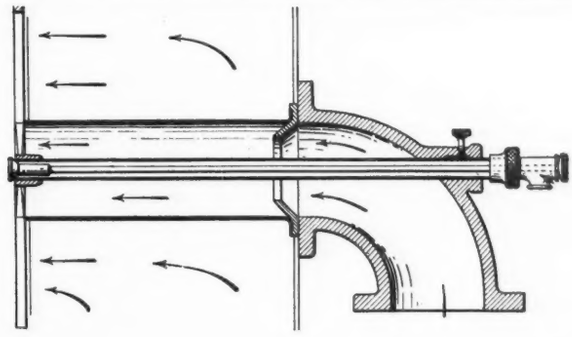
The adjustable portion of the burner is composed of twelve blades (six inside and six outside), all hinged at the inlet end of the cone, giving a fixed diameter at that end. The inside blades carry vertical "turbulating" vanes, two on each blade. The outer blades lap over the inner blades and are constructed



to ride the finished edges of the latter, forming tight joints along their entire lengths. By means of springs the outer blades are made to follow the inner blades, which, in turn, are controlled by an operating mechanism attached to a handwheel.

The burner is made in four standard sizes, ranging in capacity from 7,320 cu.ft. of blast-furnace gas or 3,978 lb. of coal an hour, to 74,400 cu.ft. of gas or 41,072 lb. of coal an hour.

Ashmead-Danks Company, 7016 Euclid Ave., Cleveland, Ohio. June 10, page 920.



Pilot Gas Igniter for Pulverized-Fuel Burners

This igniter provides a safe and convenient method of igniting pulverized fuel where gas is available. It is shown incorporated in a Riley flare-type burner arranged for horizontal firing. The gas tube is inserted in the center of the coal spreader pipe and the gas tip or spreader is made adjustable by means of a central rod and knurled nut, the spreader being adjusted to produce a flame of sufficient area to completely cover the end of the coal discharge pipe. When the coal has become properly ignited the gas is shut off and the gas spreader is drawn closed. The gas connection to the igniter is made by a flexible armor-clad hose at a tee attached to the end of the coal-spreader adjusting pipe. The igniter can be applied to practically any type of burner.

Peter Dias, 123 38th St., Irvington, N. J. May 6, page 724.

Centrifugal Lubricator for Pulverizer Roll Bearings

In the main, this lubricator, designed especially for lubricating with oil the rolls of the Raymond pulverizer, consists of a bronze casting which replaces the flanged cover on the upper end of the roll housing. The casting extends down into the space previously provided for grease. The top of the reservoir is provided with a small removable cap to permit filling with oil. The reservoir is also vented to the roll housing, so that the air pressure is the same in it as in the housing.

From a small filter compartment diametrically opposite the fill opening, a small tube is led down through the bottom of the reservoir. Oil from the main reservoir enters the filter compartment through five ¼-in. holes, and by the centrifugal force set up when the mill operates it is made to flow from the reservoir through the wool felt on the filter compartment and down the tube to the mill roll bearing. The size and length of the copper tube controls the

rate at which oils drop from its lower end on the top of the roll shaft.

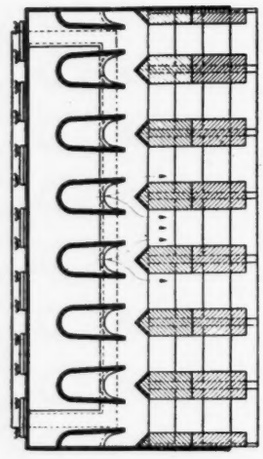
Texas Company, 135 East 42d St., New York City. May 20, page 777.

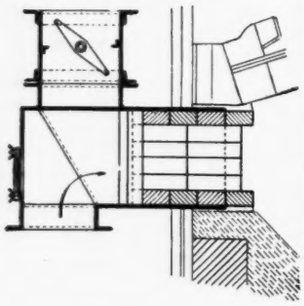
Pressure Gas Burner

Designed especially to permit of burning more gas per unit of time than is possible where the supply of combustion air is

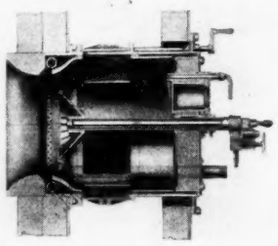
dependent upon the draft of the stack or aspirating effect of the gas stream, this pressure gas burner can be had in any desired capacity or width to suit practically any installation requirement. The burner consists of multiple gas and air ports designed to give intimate mixing. The ports are refractory-lined, and no metal surface is presented to furnace temperatures.

Gas enters the burner through a bottom connection, and the combustion air enters through a dampered connection at the top, the flow of each being directed as indicated by the arrows. Premixing of the two is accomplished by a series of deflectors at the discharge end of the gas nozzle. The burner is suitable for any gas or air temperature or pressure and can also be operated by any system of automatic combustion control.





Freyn Engineering Company, 310 South Michigan Ave., Chicago, Ill. Sept. 2, page 403.



Register For Gas, Oil and Pulverized Coal

Type C register, suitable for use with gas, oil or pulverized coal, has been built to meet conditions requiring a forced draft with preheated air running up to 1,000 deg. F. or with either natural or induced draft.

The usual vane wheel has been eliminated, air being taken through four large tangent ports. All parts of the register are constructed of heat-resisting metal and are easily accessible.

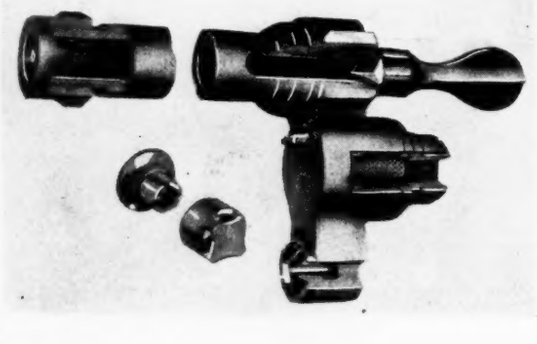
Coen Company, Inc., Story Building, Los Angeles, Calif. Jan. 20, 1931, page 122.

Mechanical Oil Burner With Compound Tip

Incorporating the important features of the previous type A, but with the burner stem spring and stuffing box eliminated, type B, non-adjustable oil burner gives a comparatively simple burner consisting, essentially, of a burner head tube and a compound tip. The tip is made up of the two parts, one containing both the outlet orifice and the atomizing chamber with tangents and the other constituting a thimble for the atomizing chamber. Both are of steel.

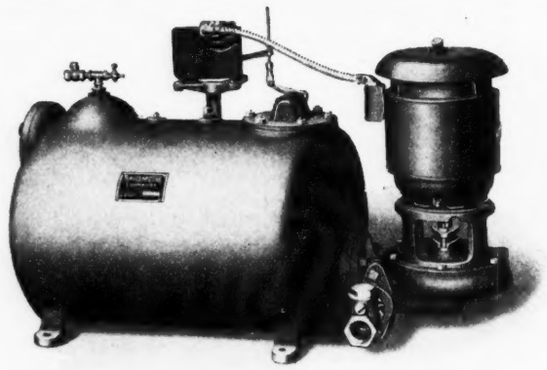
The use of the compound tip, with the double-diameter atomizing chamber, and tangents set well back from the outlet orifice, produces a fine degree of atomization even at low pressure, giving the burner a load range over 100 per cent without changing tips.

Coen Company, Inc., Story Building, Los Angeles, Calif. July 8, page 73.



Heating and Ventilating Equipment

Unit heaters designed for use with steam, gas or electricity, as the heating medium, and improved thermostatic controlling devices, streamline fan for quiet ventilating service and device to protect heating boilers against low water



Condensation Pump and Receiver

To give a low water line in the system at the time the float switch cuts in to start the pump, without necessity of pitting the unit, this condensation pump unit has a large capacity cast-iron receiver with the pump mounted on the end. A float switch on the top of the receiver controls the operation of the pump.

The pump, driven by a ball-bearing motor supported directly from the pump volute, has an inclosed bronze impeller locked on the end of the shaft against a manganese bronze sleeve which extends through the stuffing box over the shaft.

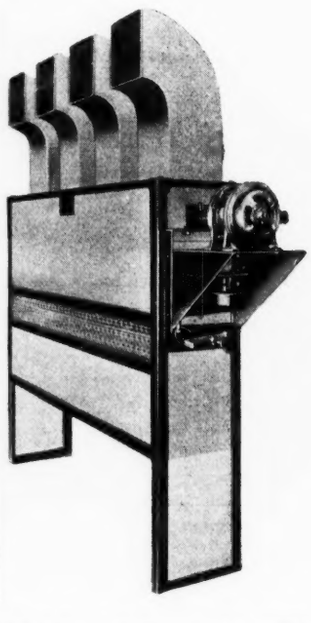
Several sizes of the unit are available, ranging in capacities from 4 to 60 gal. per minute or an equivalent radiation of 2,000 to 40,000 sq.ft., respectively.

Skidmore Corporation, 1535 Dayton St., Chicago, Ill. May 13, page 760.

Unit Heater Designed for Manual and Automatic Control

Unusual control features are embodied in this new "Super Control" heat-diffusing unit. The principle of operation is that the necessary heat output of the unit shall be mixed with room-temperature air within the heater so that the resulting mixture is always held at the lowest possible final temperature consistent with producing the required room temperature.

The same principle of high-velocity discharge as used in former models has been retained. Mixing of the heated air and room-temperature air within the heater is effected by two automatically controlled dampers, one of which regulates the amount of air passed over the steam heating element and the



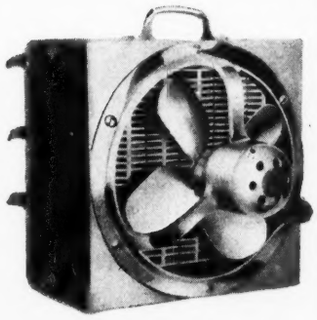
other the amount of air entering through the inlet in the front above the heating element.

No throttling of the steam is required, the unit being designed to operate with full steam pressure on the coils at all times. Units can be furnished for either manual or automatic control.

York Heating & Ventilating Company, Philadelphia, Pa. Dec. 2, page 908.

Electric Unit Heater

Characteristics of both the steam unit heater and electric heater are embodied in the unit

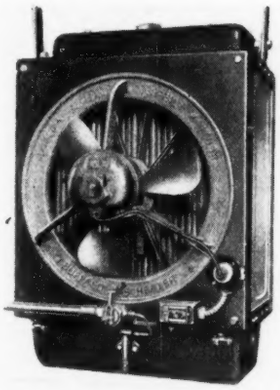


illustrated. Special alloy heating strips are cast integrally with composite fins of aluminum alloys, making up into a single smooth casting that allows an uninterrupted flow of air through its channels. The heater can be installed permanently or used as a portable heating unit. It is particularly applicable for heating isolated buildings, for intermittent heating needs, and for "off-season" heating.

American Foundry Equipment Company, Mishawaka, Ind. Sept. 16, page 474.

Gas-Fired Unit Heater

Designed especially for use where steam is not available and as a booster for existing heating systems, this new gas-fired unit heater is self-con-



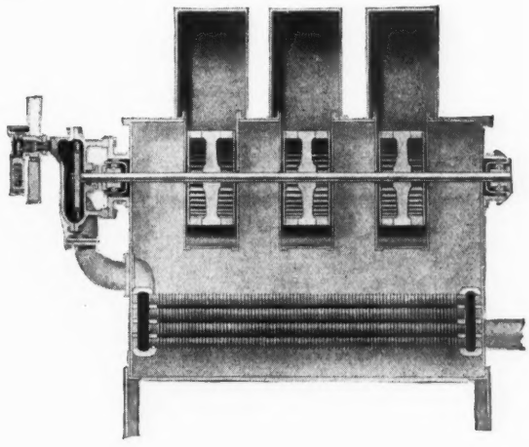
tained and is provided with full automatic control.

The heat-interchanging element consists of brass tubes in staggered rows. The heat from the gas burner is directed through the tubes, and air is made to pass around them by a motor-driven fan mounted at the rear, as shown. By means of an adjusting screw on the gas valve the amount of gas consumed can readily be controlled, a variation of 50,000 to 150,000 B.t.u. being made by this adjustment. The complete burner unit is contained in a metal combustion chamber at the bottom, which is hinged at the back and held in place at the front by three hand clamps. The pan with burner assembly can be dropped without making any break in the gas or electrical connection.

Buffalo Forge Company, Buffalo, N. Y. Oct. 7, page 590.

Steam-Turbine-Driven Unit Heater

In this steam-turbine-driven unit heater of the high-velocity, multi-fan type, designed for either high-pressure or low-pressure heating systems, the shaft speed is low, only 1,140 r.p.m. The impulse turbine



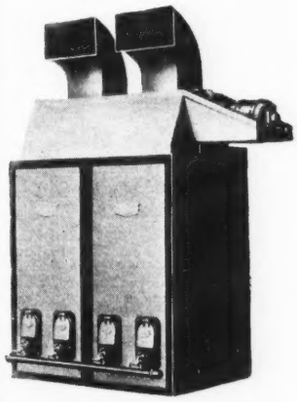
wheel is fitted with stainless steel buckets, and a nozzle with adjustable needle valve is provided. A thermostatic valve controls the amount of steam admitted to the turbine as governed by the room temperature.

A combined steam condenser unit and air-heating element is mounted in the casing directly below the fans. It consists of ¾-in. copper tubes with continuous spiral fins and cast-iron header suitable for 200 lb. pressure. Three multi-vane fans propel the air, the complete fan assembly being mounted on self-aligning anti-friction bearings in adjustable housing. The unit is made in five sizes in both floor and ceiling types.

Automatic Turbo Heater Company, 343 South Dearborn St., Chicago, Ill. Oct. 14, page 625.

Gas-Fired Multiple-Unit Heater

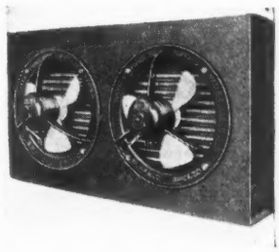
In this type-V gas-fired warm-air heater two, four, six or eight combustion units can be grouped to form assemblies rated at from 100,000 to 400,000 B.t.u.



per hour. The base is cast iron, with the unit supported on two cross I-beams. The fan shaft, which operates at 860 r.p.m., is carried on ball bearings and is connected to the motor through a flexible coupling. The gas burners, of which there are four per unit, are automatically operated by a thermostat and motor gas valve. The air fans are automatically started and stopped at a point after the burners have turned on or off, so that no cold air is circulated.

Approximate over-all dimensions and fan capacities of the different assemblies are as follows: Front to back, all sizes, 36 in. Height to top of hood, all sizes, 87 in. Front width, type 2UV, 30 in., fan capacity, 1,560 cu.ft. per minute; type 4UV, 54 in., 3,060 cu.ft.; type 6UV, 78 in., 4,575 cu.ft.; and type 8UV, 102 in. and 6,100 cu.ft. The discharge-air temperature is under 140 degrees.

Reznor Manufacturing Company, Mercer, Pa. April 1, page 528.



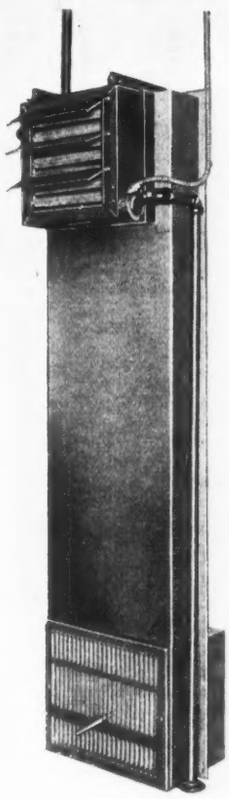
Twin-Fan Unit Heater in Three Sizes

Made in three sizes for steam pressures up to 40 lb., this unit heater employs two 16-in. fans mounted on a single heating unit. The smaller-capacity fans are driven by 1/20-hp. motors, and the units are rated at 2,070 c.f.m. Details of the other two models are $\frac{1}{6}$-hp. fan, 2,800 c.f.m.; and $\frac{1}{3}$-hp. fan, 3,505 c.f.m. The heating element is made up of Aerofin coils, and only one set of steam and drip connections is necessary. With the fans' motors connected for separate control one fan may be shut down when desired.

Buffalo Forge Company, Buffalo, N. Y. July 8, page 74.

Cabinet Unit Heater

With an air intake provided through the wall of the building as an alternate source of air, a damper incorporated in this cabinet heater permits either one



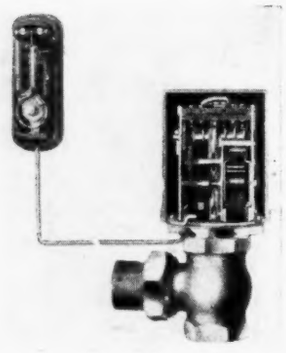
or both air inlets to be used at the same time. Summer ventilation with outside air is thus possible, as well as winter ventilation with inside air. Immediately above the air inlets is a steel-wool air filter that is readily removable for cleaning.

A standard unit heater is used. It has airplane-type fan and individually adjustable louvers. The cabinet has a flush panel door through which the motor of the heater may be reached. It is designed for hot water, vapor or steam and is suitable for use on high-pressure lines.

Wolverine Tube Company, Detroit, Mich. Dec. 23, page 1024.

Electric Temperature Control System

A bimetallic loop-type thermostat and a motor-operated radiator valve are incorporated in this electrically operated system of temperature control. The valve is actuated by a small induction motor operating through a gear train and a two-roller cam. Flexible metal bellows



type of packing in the valves eliminates packing troubles and the usual friction on the valve stem.

The system is suitable for use with practically all types of steam-heating installations, including indirect heating, combination direct and indirect radiation, zone control of building, etc. It can also be adapted to control oil and gas burners, stokers and damper regulators. When used with oil or gas burners the last valve of the series controlled by one thermostat has its auxiliary contact connected to a relay switch in such a manner that the burner starts when any valve or any number of valves are opened. The valves are available in angle, straightway, right- and left-hand corner patterns, in sizes from ½ to 2 inches.

Barber-Colman Company, Rockford, Ill. Nov. 18, page 813.

Thermostat for Heating Control

Thermostat No. 855 requires no relay and will operate directly where the normal current working load does not exceed 10 amp. at 110 volts or 5 amp. at 220 volts.

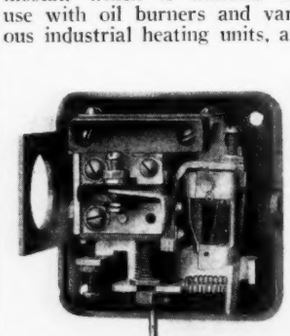
The inclosed fluid in the thermostatic element, as it expands or contracts, actuates a plunger which, in turn, operates the movement by throwing the switch to the "on" or "off" position. The design eliminates the usual ventilating apertures in the cover.

All adjustments are protected within the instrument but are readily accessible. Standard operating range is from 56 to 80 degrees.

Mercoid Corporation, 564 West Adams St., Chicago, Ill. July 8, page 73.

Thermostat to Control Industrial Heating Coils

Operating ranges of this thermostat, which is suitable for use with oil burners and various industrial heating units, are



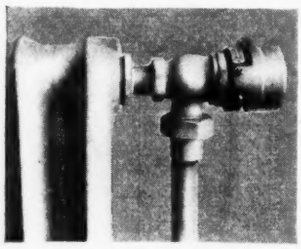
60 to 200 deg., 150 to 300 deg., and 250 to 400 deg. F. It has an operating differential of 5 per cent of maximum temperature range.

The unit is mounted on a pressed-steel base which has two mounting holes and a bracket with an opening for a ¾-in. conduit. All steel parts are cadmium-plated to resist corrosion. Silver contacts are used. A ½-in. capillary tube sealed to the bellows on the switch end has a bulb on the immersion end.

General Electric Company, Schenectady, N. Y. July 1, page 37.

Thermostatically Controlled Radiator Valve

Designated "Arco Radiatherm," this thermostatically controlled radiator valve is made in three types, No. 230, adapted to cast-iron radiation either with or without in-

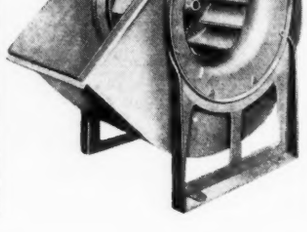


closures and where there is a constant supply of steam at the valve; Nos. 225 and 226, remote-control units, are for all types of radiation, either with or without inclosures and with either a constant or intermittent steam supply. No. 230 is connected horizontally, while the remote-controlled units are connected with the body in a vertical position and with the bulb attached to the inclosure or wall. Temperature adjustments are provided on all types. The adjustable range of the valve is from 35 to 80 deg. It is made in three sizes, ½-, ¾- and 1-in. diameter pipe.

American Radiator Company, 40 West 40th St., New York City. Jan. 20, 1931, page 121.

Streamline Fan for Ventilating Service

High efficiencies over a wide range, a self-limiting horsepower characteristic, a practically linear pressure curve, and quiet operation at high speeds are important features claimed for this streamline ventilating fan. All air passages are free



of obstructions, with all edges that cut the air stream well rounded.

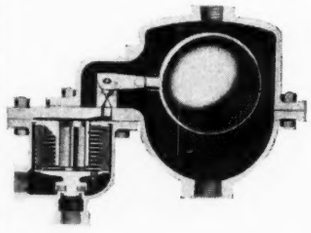
Arc welding has replaced rivets wherever practical in construction of the wheel. Two types of wheels are available, normal-duty wheels for top speed of 7,000 ft. per minute, and heavy-duty wheels for speeds between 7,000 and 10,000 ft. per minute. A continuous fillet weld the entire length of the joint joins the side and scroll sheets.

The fan is made in a number of sizes, ranging in capacities from 900 to 50,000 c.f.m., and for static pressures from ⅛ to 3½ inches.

Massachusetts Blower Division of the Bishop & Babcock Sales Company, 4901 Hamilton Ave., Cleveland, Ohio. April 29, page 687.

Device to Protect Heating Boilers Against Low Water

Designed to protect low-pressure heating boilers against accidental low water level, this protector is installed with its water line 1 in. above the bot-



tom of the boiler gage glass or approximately 3 in. below the normal boiler water line. It is, therefore, inoperative as long as the boiler water line is maintained in normal position. Although it will operate as a "feeder," the manufacturer recommends that the normal water level be maintained by manual control.

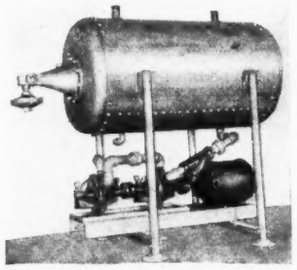
The pressure of the raw water supply is maintained in the valve chamber, and a fixed orifice allows the bellows to be normally filled with water at the same pressure. The water valve is normally held on its seat by the water pressure.

When the water level falls below normal the float drops, opening a small valve having a much greater area than the orifice leading to the bellows and causing a definite drop in pressure between the inside and outside of the bellows. This pressure difference compresses the bellows, lifting the valve from its seat and allowing water to flow into the boiler.

Warren Webster & Company, Camden, N. J. Nov. 4, page 739.

Automatic Boiler-Feed Unit

Style 23T boiler-feed unit consists of a tank or receiver equipped with a make-up water control valve and mounted above a motor-driven pumping unit comprising two centrifugal pumps connected in series. The pumps draw their water supply from the tank, which is vented to the atmosphere and into which all the condensation is discharged by return-line pumps or traps, and to which the make-up water is supplied by a float-type feed-water regulator. The units are designed to supply either high- or low-pressure boilers with feed water or return condensate to the boiler and supply make up as required.



Automatic operation of the pumping unit is effected by an electric switch mounted on a float chamber attached to the boiler with which the feeder is used. The unit is equipped with a 30-gal. receiver, and the approximate dimensions are 46x30x37 in. Units are also available with a single pump and with two pumps connected in parallel.

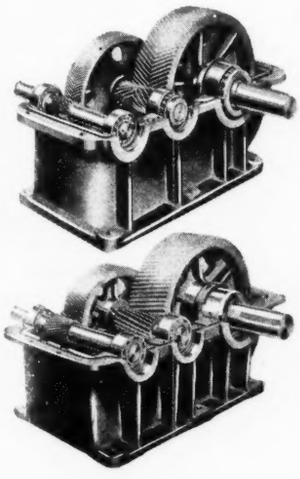
Mears - Kane - Ofeldt, Inc., 1903 East Hagert St., Philadelphia, Pa. July 15, page 114.

Mechanical Transmissions

Straight-line, right-angle, infinitely variable speed reducers; magnetic and mechanical clutches; V-belt and chain drives; ball and roller bearings

Herringbone- and Helical-Gear Speed Reducers

With the exception of the gears used, the two types DB and DX are practically identical. Ribs are provided at each bearing to insure rigidity, and the inside of the upper case is also ribbed as a precaution against longitudinal vibration. Grooves are provided for the return of oil from the bearings to the bottom of the case. Splash lubrication is standard. Ball bearings are used on the high-speed shaft and roller bearings on the low.

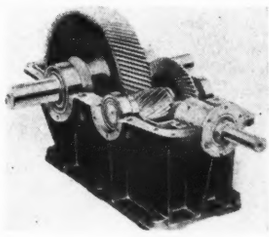


One of the important features of the line is that the ratio is standard and applies to all sizes for each type of reduction. On the single-reduction units, types SB and SX, the ratios range from 2.87 to 9.9. On the double-reduction units, types DB and DX, the ratios range from 9.95 to 96.2.

Foote Brothers Gear & Machine Company, 111 North Canal St., Chicago, Ill. July 1, page 38.

Right-Angle Drive Speed Reducer

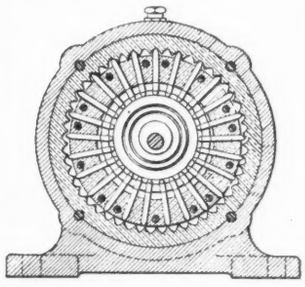
Features of this right-angle drive are a combination of single helical and spiral bevel gears and the reversible construction of gears and shafts. If the gears become worn after years of service, the shafts can be turned end for end to permit using the opposite, unworn, sides of the teeth. The lubricating system is simple and self-contained. It gives complete lubrication of the working faces of the gear teeth at all speeds and rapid circulation of oil through the bearings. Ratings range from $\frac{1}{16}$ hp. at 100 r.p.m. on the smallest unit to 565 on the largest. Ratios are from 1.5:1 to 518:1.

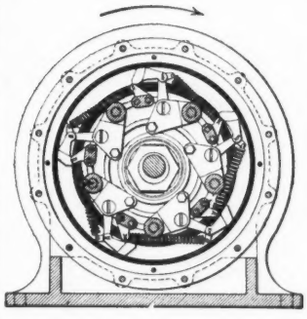


Falk Corporation, Milwaukee, Wis. Feb. 4, page 191.

Fixed-Ratio and Infinitely Variable Speed Reducers

Two types of power transmissions, known as the "Heliocentric" and the "Revocentric," infinitely variable speed reducers, are illustrated. The "Hellocentric" unit consists, essentially, of a casing around the inner periphery of which is an internal gear rack. Inside of this is a spoolpiece carrying a number of plungers that bear, at their inner ends, upon an eccentric. The eccentric is driven at the high speed of the motor, and the spoolpiece, connected to the low-speed side, is driven at a reduced speed as the plungers are forced against the rack by the eccentric rotation.



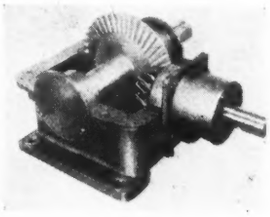


Reducers of this type are made for reductions of from 8 to 1 up to 60 to 1, and, by using two or more reducers in series, in ratios as high as 1,000,000 to 1. These reducers also are built as an integral part of an electric motor.

The "Revocentric" reducer consists of an adjustable-throw eccentric on the input shaft, driving five clutches through toggle joints mounted between two disks on the output shafts. The eccentric rotates at the input speed. It carries, on a roller bearing, a ring which is practically stationary angularly with respect to the output system, but which oscillates as the eccentric rotates.

This reducer is infinitely variable in output speed from one-thirteenth of the input speed to zero. The speed may be varied while the gear is in motion and under load. It is available in sizes up to 15 horsepower.

Universal Gear Corporation, 327 South La Salle St., Chicago, Ill. June 17, page 962.

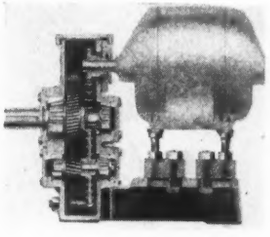


Right-Angle Speed Reducers

Made in ratings ranging from ¾ hp. to 100 hp., with ratios of 1 to 1 to 6 to 1, the right-angle speed reducers included in this line have spiral bevel gears mounted on roller bearings and are made in both horizontal and vertical types, with slow-speed shaft extended either upward or downward.

Larger reductions are obtained by combinations of the spiral bevel gear and planetary spiral gears with ratios of 8 to 1 up to 1,600 to 1. Gears and bearings are splash-lubricated.

D. O. James Manufacturing Company, 114 West Monroe St., Chicago, Ill. April 29, page 687.



Improved Speed Reducer Unit

Chief among the improvements recently made to this speed reducer are the substitution of roller bearings for phosphor bronze bearings and the use of helical in place of spur gears.

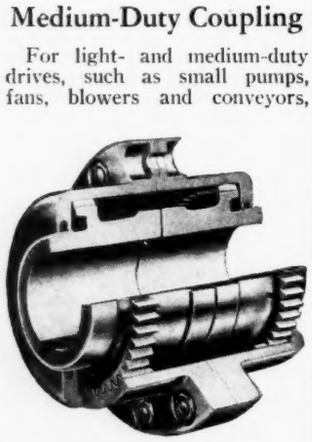
Sprockets and roller chain for

the first reduction from two to six times that of the motor speed have been retained. Some changes have been made in the oiling arrangement of the main gear bearing and where the motor shaft enters the reducer. At the latter point the hub of the sprocket has been extended into the oil chamber, replacing the ring formerly used.

Cullman Wheel Company, 1346 Altgeld St., Chicago, Ill. May 20, page 798.

Medium-Duty Coupling

For light- and medium-duty drives, such as small pumps, fans, blowers and conveyors,



this coupling is especially suitable. The design follows closely the heavy-duty geared-type coupling put out by the same manufacturer. Both sleeves and hubs are machined from solid bars of high-carbon steel. Sleeve members and end plates are integral. Three sizes of the coupling are available, 1-, 1½- and 2-in. bore diameters, with capacities ranging from 3 to 20 hp. per 100 r.p.m. Over-all lengths range from 4 to 7 inches.

Poole Engineering & Machine Company, Baltimore, Md. Jan. 20, 1931, page 123.

Improved Magnetic Clutch

More consistent operating characteristics, easier installation, greater safety and easier access to parts are claimed for this type L magnetic clutch. A centering bearing, which is a roller bearing mounted in the field member and which protrudes so that it fits into a recess in the armature hub, forms a common support for both clutch members, yet allows either member to revolve independently of the other when disengaged.

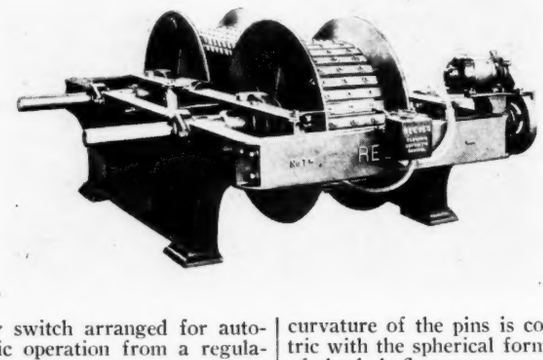
The collector rings are made of brass and are mounted away from the hub, on four insulated studs, so that it is practically impossible for sufficient dust to collect to cause creepage between the rings. Two carbon brushes are used on each ring.

Cutler-Hammer, Inc., 190 12th St., Milwaukee, Wis. Sept. 30, page 551.

Remote Controls for Variable-Speed Transmission

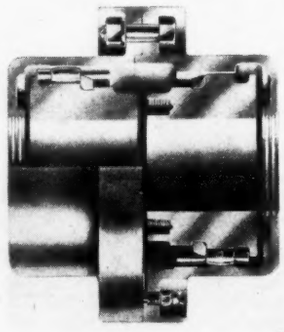
To make possible accurate synchronizing of a series of machines or sections of a machine automatically, or regulating the speed of travel to compensate for varying operating conditions, electric automatic control and electric remote control have been applied to this transmission.

The new controls embody a specially designed two-way mercury switch arranged for automatic operation from a regulator or moving part of the machine to be controlled and a solenoid brake to stop the speed-adjusting motor.



The two controls (remote and automatic) are identical, with the exception of the switch. In the remote control, in place of the two-way mercury switch, a special push-button station is furnished with "fast" and "slow" buttons to operate the motor in either direction. These push buttons also operate the solenoid brake. The stations may be located at any distance from the machine and two or more may be used. Where two or more transmissions are equipped with electrical remote control they may be controlled in synchronism from one master push-button station, and each transmission may also have an individual station.

Reeves Pulley Company, Columbus, Ind. Sept. 23, page 513.



Improved Flexible Coupling

In the T.Q.E. flexible coupling a floating casing forms a connection between two hubs, each keyed to a shaft near its ends. The casing has inwardly facing flanges machined to a cylindrical bore, which are a close sliding fit on the spherically curved perimeter of outwardly facing flanges on each of the hubs. Driving connection between the hubs and casing is afforded by barrel-shaped pins fitted in holes bored half their diameter in the hub flanges and half in the casing flanges. The longitudinal radius of curvature of the pins is concentric with the spherical formation of the hub flanges.

This coupling permits of a large eccentricity or parallel misalignment of shafts, approximately $\frac{3}{32}$ in. in the 2-in. shaft size.

C. O. Thomas, 91 Grand Boulevard, Montreal, Quebec. July 15, page 115.

One-Way Non-Slip Clutch

Designed to take the place of any form of ratchet or backstop, the Pitter clutch is claimed to be instantaneous on clutching and release and to operate without lost motion. It consists of a central spindle carrying three pivoted arms at the outer end of which are shoes fitting in an annular groove.

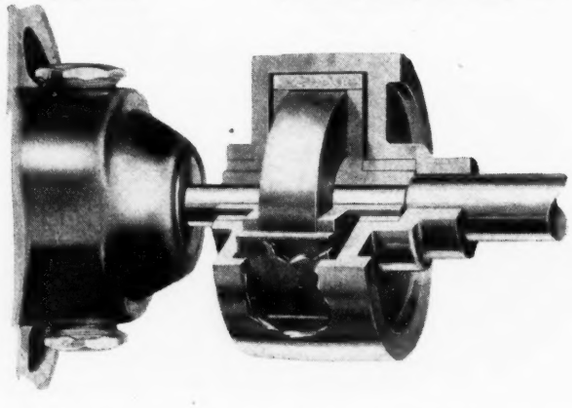
In operation, when the spindle is rotated in the driving direction, the shoes lock against the inner and outer sides of the groove, thus giving a positive lock at two points on each of the three shoes. All parts are lubricated, as the clutches are

made oil-tight and filled with oil. Sizes are available for shaft diameters from ¼ to 6 inches.

Universal Gear Corporation, 327 South La Salle St., Chicago, Ill. July 29, page 191.

Combined Coupling and Clutch

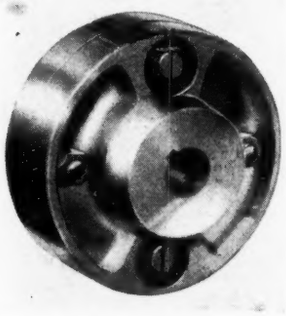
To permit of using a motor of the correct size for normal operation of a machine regardless of starting torque is the function of this starter. Essentially a combination of a clutch and flexible coupling, this starter consists of an outer housing keyed to the driven shaft, an expanding centrifugal accelerator keyed to the motor shaft, frictional linings and equalizing separators. The expanding accelerator contains a fluid (usually mercury for the



smaller sizes and water for the larger sizes) which, when the accelerator is revolved, automatically gives the necessary pressure on the housing to transmit power to the driven shaft. In starting, the liquid is in the lower part of the accelerator, and there is an interval before it becomes distributed uniformly around the accelerator.

It may also be applied to the driven unit, and can be arranged for direct connection, gear, chain, V-belt, or flat-belt drives. It will operate equally well in either a vertical or horizontal position or in either direction of rotation.

Washburn Shops of the Worcester Polytechnic Institute, Worcester, Mass. June 3, page 885.



Flexible Coupling With Aluminum Alloy Flanges

Constituting this flexible coupling are aluminum alloy flanges fitted with ground alloy steel drive studs and specially compounded rubber bushings cemented to hard bronze bearings. Other details of the coupling are, weight, 2 lb.; outside diameter, 4 in.; over-all length, $2\frac{1}{16}$ in.; horsepower, at 1,750 r.p.m. and steady loads $7\frac{1}{2}$; maximum bore, $\frac{1}{2}$ inches.

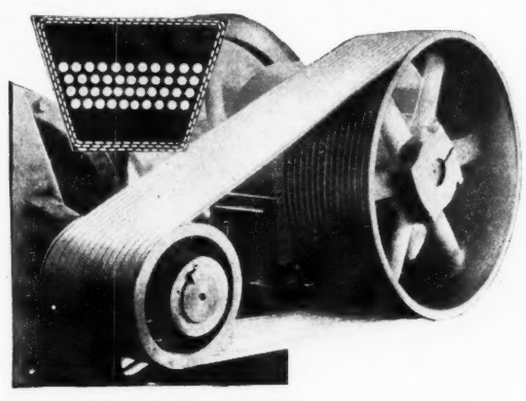
Ajax Flexible Coupling Company, Westfield N. Y. Sept. 2, page 402

Multi-V-Belt Drive

This drive consists of a number of endless molded V-belts running in V-grooved sheaves. It combines a rubberized cord V-belt impervious to dust and moisture, with an improved V-grooved sheave. The load-carrying members are high-grade cotton cords arranged in parallel lines and concentrated about the neutral axis.

Among the claims made for this belt are, high power capacity, long flexing life, low stretch, accurate cross-section and high-quality rubber. Each sheave is grooved, machined and finished, so that the grooves present a smooth surface on which the belts run. Quiet operation, small floor space and higher speed ratios are other features.

Worthington Pump & Machinery Corporation, Harrison, N. J. Aug. 19, page 303.

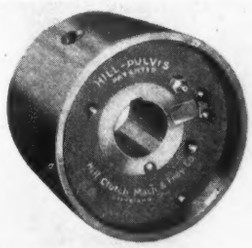


Variable-Speed Transmission

Compactness and the adoption of ball bearing and pressure lubrication throughout are features of this series 100 variable-speed transmission. The inclosing case is water- and dust-tight, and access to the interior is had by removing the one-piece cover. Variation in the speed of the driven shaft is effected through a handwheel mounted on the side At one end an indicator shows the various positions between maximum, high and low speeds.

This series is available with drive motor support and remote control. It may be supplied in regular speed ranges.

Lewellen Manufacturing Company, Columbus, Ind. Sept. 9, page 435



Centrifugal Clutch Gives Slow Acceleration and prevents Overload

Briefly, this Pulvis - type clutch, designed to give slow acceleration and prevent overload, consists of three parts, a cylindrical housing attached to the driven unit; a winged hub, free to revolve within the housing and constituting the driving member; and a quantity of chilled balls or shot which form the power-transmitting medium between the two members. The balls are only 0.023 in. in diameter and are graphite-coated to give the necessary protection against rusting or corrosion, and for lubrication.

In operation, the chilled shot forms in drifts ahead of wings on the driving member, and by centrifugal force the density of the shot drift is increased to a point where the friction on the inner serrated surface of the housing is sufficient to hold the two members stationary in relation to one another. If the load increases above normal the machine slows down, while the motor continues to run at approximately normal speed; when the load returns to normal the machine is again accelerated to the speed of the motor.

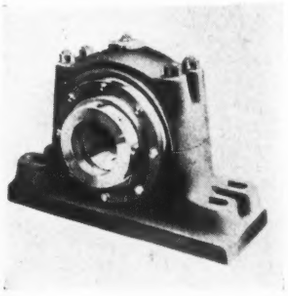
Practically any accelerating characteristic and driving power can be obtained by changing the quantity of chilled shot. In addition to the pulley type shown, the clutch is made in a coupling type for direct drives and in an extended sleeve type for other than belt or direct drives.

Hill Clutch Machine & Foundry Company, Cleveland, Ohio. Jan. 27, 1931, page 161.

Roller-Bearing Ball-and-Socket Pillow Block

Some of the features of this roller bearing pillow block are: Ball-and-socket design for complete alignment; positive-pressure lubrication; adequate closures; double-bearing construction; and the use of adapter sleeves.

The bearing consists of two tapered-roller bearings, with inner races abutting and secured on the shaft by tapered adapter sleeves. Seal against entrance of dirt is by three grease grooves and a labyrinth formed between the adjusting collars and the housing ends.

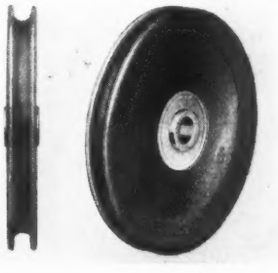


These bearings are designed for grease lubrication through an industrial fitting, piped to a point between the two roller bearings. The pillow block is available in commercial sizes for $1\frac{7}{16}$ in. up.

Link-Belt Company, 910 South Michigan Ave., Chicago, Ill. July 29, page 192.

Molded Compound Pulleys

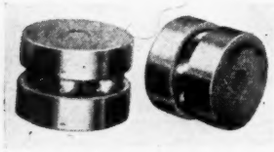
These pulleys are made of "Textolite" molded around ball bearings. The bearings are of the single-row, self-contained type with dust shields, and the molded material is fabric-filled compound. Four sizes suitable for various industrial applications, as in signal work, materials handling, elevators, etc., are supplied in various combinations of pin diameters and bearings.



General Electric Company, Schenectady, N. Y. Oct. 28, page 701.

End-Thrust Ball Bearing

This end-thrust bearing is designed to fit in a recess at the end of the shaft, the recess being of the same diameter as the shaft. Because of the small-



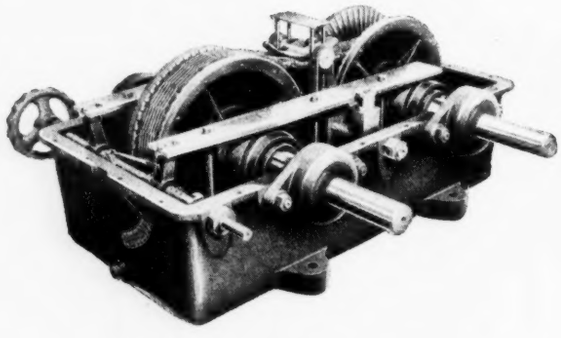
pitch diameter of the ball groove and the large size of balls used, the peripheral speed of the balls is relatively low. The two races and balls are held together as a unit by a pin which is flanged at one end and makes a force fit at the other, permitting of free rotation of the races yet holding them together. Bearings are available in sizes from $1\frac{3}{16}$ to $3\frac{15}{16}$ in. in diameter.

Auburn Ball Bearings Company, 57-85 Clarissa St., Rochester, N. Y. June 24, page 1006.

Positive-Drive Variable-Speed Transmission

The important feature of this positive infinitely variable speed-change unit is its use of a positive chain drive to transmit the power. Radial teeth are cut in the conical faces of the driving disks, and the self-adjustable teeth projecting beyond the sides of the chain are arranged to positively engage the radial teeth of the disks.

The chain is made up of a series of steel leaves or links with joints, consisting of hardened steel pins turning in segmental bushings. The teeth on the side of the chain are of

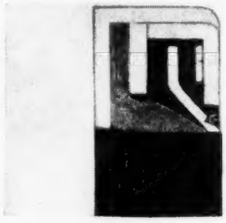


packs of thin hardened steel laminations or slats which extend through slots in the links at right angles to them and project about $\frac{1}{8}$ in. at each side of the chain. The individual containers that hold the packs of slats are secured in the openings of the links, but within each container the slats are free to slide from side to side individually and adjust themselves to engagement with the radial teeth of the disks over substantially the full range of diameters. The angle of the slat ends, 30 deg., is the same as that of the conical faces of the wheels. The gear is available in a number of sizes, providing speed-change ratios up to a maximum of six to one.

Link-Belt Company, 910 South Michigan Ave., Chicago, Ill. Dec. 16, page 986.

Shaft Bearing Oil Seal

This precision oil seal is designed to exclude water and foreign matter from bearings and to operate equally well on hori-



zontal and vertical shaft applications.

It is made up of six parts, an outer retaining member, a leather gasket, gasket washer, an inner retaining member, a gasket expanding member, and a crimped annular spring for sealing the gasket against the shaft. The gasket is beveled to a feather edge, and the ring bears against it just back of the edge, so that it is held firmly against the shaft.

The seals are available in shaft sizes from $\frac{7}{16}$ to 6 in., inclusive.

Gits Brothers Manufacturing Company, 1846 South Kilborn Ave., Chicago, Ill. Jan. 27, 1931, page 161.

Roller Chain Drives

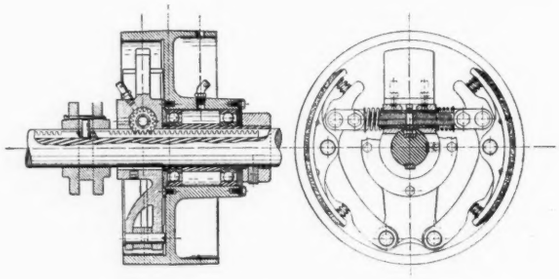
Stock drive for power applications consisting of roller chain and two sprockets, ready to be installed, are available from distributors in single to quadruple strands, having capacities from $\frac{1}{4}$ to 75 hp. in ratios up to 8.4 to 1 and for motor speeds up to 1,750 r.p.m. This supplements

a regular line of high-speed drives available in capacities up to 672 hp. and speeds up to 3,600 revolutions per minute.

Diamond Chain & Manufacturing Company, Indianapolis, Ind. Sept. 9, page 436.

Clutch With Self-Equalizing Friction Shoes

Friction shoes in this clutch are so hinged and mounted that they automatically take care of any wear. The expansion units are made up of right- and left-hand studs which screw into the hub of a spur gear. When a



rack mounted in a slot in the shaft is moved in one direction the gear revolves and forces the friction member out into contact with the pulley rim.

When all the wear is taken up by the float, of $\frac{3}{16}$ in., an adjustment can be made by removing the link screws and making one turn of the pivot screws outward.

Duro-Friction Clutch Company, Grand Rapids, Mich. July 15, page 114.

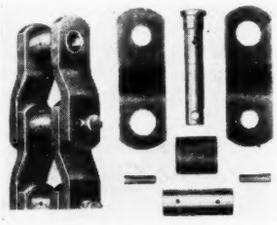
Actinized Bearing Bronze

High-lead bronze in which by a special "Actinizing" process all internal strains, growth and distortion are said to have been eliminated has been made available in cored and solid bars, drawn rods and castings of all sizes. It can also be had in soft, medium and hard grades. The metal is claimed to have a true homogeneous structure, with the lead particles embedded in the matrix.

Sumet Corporation, Buffalo, N. Y. March 25, page 489.

Roller Chain for Heavy Duty

This steel drive chain is made from alloy steel, heat-treated, and uses a new type of pin and cotter. The pins, bushings and holes in the side bars are accurately ground, insuring good fits and giving a chain construction that combines great strength with durability. The cotters are of a special type designed so as not to work loose when once inserted and swelled into the holes in the pins. The



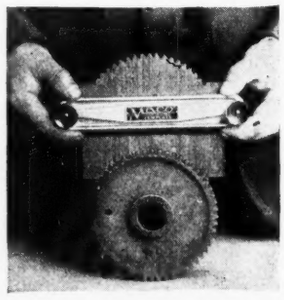
SS-40 chain has an ultimate strength of 75,000 lb. and the SS-124 chain an ultimate strength of 150,000 pounds.

Link-Belt Company, Indianapolis, Ind. May 6, page 726.

Adjustable Template

Checking and recording of wear on teeth of spur gears, measuring wear on sheave grooves of elevator equipment and also wear on wheels and rails of industrial conveyors is readily done with the Maco "template."

In using the template, the clamps are loosened slightly

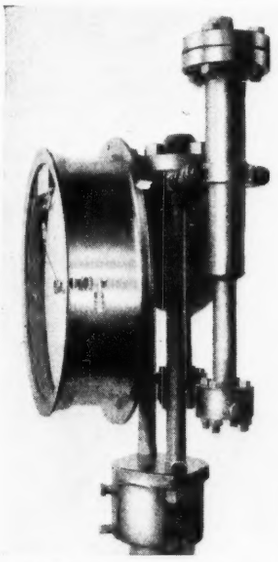


and the ends of the laminations are pressed against the member of which a template is desired.

Maco Template Company, 44 Whitehall St., New York City. June 24, page 1005.

Meters, Recorders and Measuring Devices

Indicating gages for pressures up to 10,000 lb., flow-meter bodies for pressures up to 5,000 lb., improved CO_2 indicators and recorders, and instruments for the measurement of concentration of boiler water



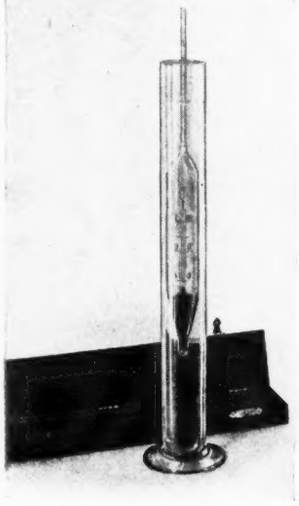
High-Pressure Flow Meter and Flow Controller

A single-pen recording flow meter and flow controller for operating pressures of 2,500 lb. is illustrated. If static readings are needed a two-pen instrument with static element is furnished. Where total flow readings are desired an integrator can be supplied on the instrument. The integrator gives flow readings without the use of multipliers. All parts are designed for high-pressure application and all working parts are drop forgings.

Foxboro Company, Foxboro, Mass. Sept. 9, page 435.

Concentration Indicator for Boiler Water

This instrument shows boiler concentration directly in grains per United States gallon. It consists of a combination thermometer and hydrometer, the thermometer having a scale graduated from 80 to 100 deg. F.



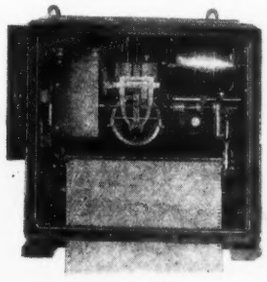
The hydrometer scale, which reads directly in grains per gallon, is calibrated for every 10 gr. from 0 to 500.

A sample obtained from the water column line is poured into the sample jar and the concentrometer is lowered into it and allowed to find its own level. When the sample has cooled to 90 deg. F., as shown by the thermometer, the hydrometer scale is read at the level of the water in the sample jar. The instrument affords a practical method of supervising boiler-water control and is adaptable to the smallest or the largest plant.

Elgin Softener Corporation, Elgin, Ill. April 1, page 527.

Direct-Reading Humidity Recorder

As in the ordinary psychrometer, the basis of the measure-



ment in this direct-reading humidity recorder is the difference in temperature of wet- and dry-bulb thermometers in a current of air.

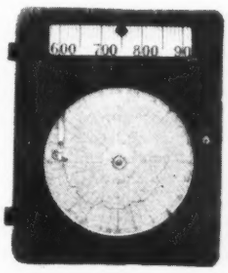
The complete equipment comprises two separate electrical units, one designated the wet- and dry-bulb apparatus and the other the recorder. These are connected together by suitable electrical conductors and may be placed any reasonable distance apart.

The recorder draws a continuous curve on a chart 10 in. wide, with a scale reading directly in relative humidity from 20 to 100 per cent. The chart is moved forward at a rate of $1\frac{3}{8}$ in. per hour.

Leeds & Northrup Company, 4901 Stenton Ave., Philadelphia, Pa. May 6, page 725.

Potentiometer Pyrometer

A special method of making definite and reliable contact between the needle of a galvanometer and stationary contact pieces has eliminated the use of depressor bars, cam mechanisms and continuously operating motors in this instrument. The



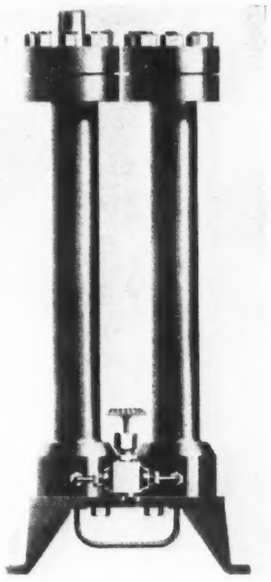
recorder retains all the advantages of the potentiometer, and improved contact method permits placing the galvanometer apart, and at almost any distance from, the recorder. A single galvanometer will actuate as many as four recorders in different locations, each measuring a different temperature, and, if desired, each having a different calibration.

The entire recording mechanism is fastened to a frame hinged to the case, giving accessibility to all parts of the apparatus. A small motor operates only as and when necessary to adjust the pen to the proper temperature reading on a clock-driven chart. The legibility of the figures, the exceptional length of the scale and the fact that it is illuminated from the rear make it easily read at a distance of 75 ft. or more. Either a thermocouple or an electric resistance bulb may be used as the temperature element.

Uehling Instrument Company, 26 Vesper St., Paterson, N. J. Sept. 30, page 550.

Flow Meter Bodies for High Pressures

Model H-1500 meter body is furnished to measure the flow of steam, water, gas or air, on



a maximum differential pressure ranging from 72 to 287 in. of water, and any pressure up to 1,500 lb. A model H-5000 is also available for pressures up to 5,000 pounds.

The pressure chambers are made of heavy seamless open-hearth tubing, with flanges and top caps made from solid blocks of steel. The bottom flanges are screwed to the pressure chambers against a gasket, and are back-welded. Both meter bodies are adaptable to practically any type of valve or fitting.

Republic Flow Meters Company, 2240 Diversey Parkway, Chicago, Ill. Jan. 20, 1931, page 123.

Steel Spring Recording Gages

This alloy-steel helical spring movement for recording gages is of one-piece tubing, all-steel and all-welded. It is suitable for use on gas, water, steam, oil, air, brine, chemicals, etc., where the pressures do not exceed 2,000 lb. per square inch.

The alloy-steel movement may be specified with new recording gages or may be ordered sep-

arately to be installed in old recording gages now in operation.

Foxboro Company, Foxboro, Mass. Dec. 30, page 1062.

Instrument for Measurement of Sodium Sulphate

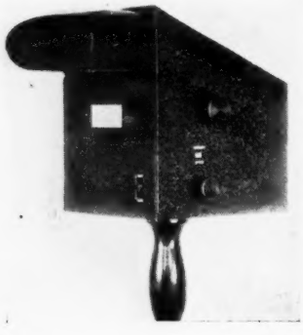
Developed to provide a ready means of measuring the sodium sulphate in boiler waters, the "turbidimeter" can also be used in the analyses of fuels for sulphur. It consists of a bakelite-walled container having an optical glass bottom, a plunger tube of similar construction, a mechanism for altering the distance between the bottoms of the two tubes, and an eyepiece tube using a soft rubber shield, all mounted upon a metal base containing an electric filament lamp with a rheostat and voltmeter for controlling the lamp voltage.

The reading in millimeters of solution is made from the scale on the instrument, and by referring to a chart provided the quantity of sulphur or sulphate can be determined.

Burgess-Parr Company, 111 West Monroe St., Chicago, Ill. Jan. 13, 1931, page 82.

Rotoscope for Slow-Motion Study

With this instrument periodic motion, whether rotary, oscillatory, vibratory or reciprocating, can be observed and studied and the speed of a moving object can be determined without physical contact. Slow-motion study and exact timing at any speed from 100 to 40,000 movements is possible.



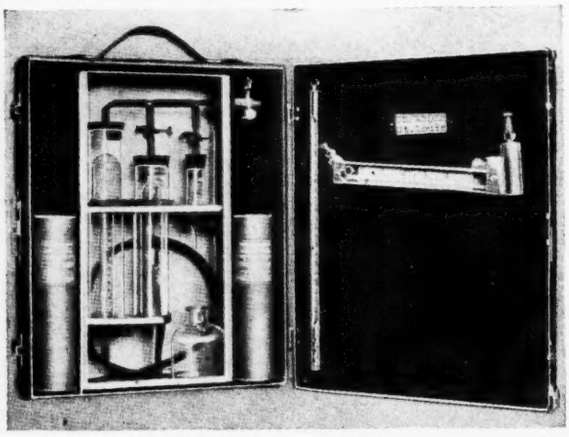
A rotary cylindrical shutter the speed of which can be varied by rapid adjustments, is capable of giving as many as a thousand glimpses a second blended into a continuous impression.

The operator holds the instrument in his left hand, with the shutter aperture to his eyes, and adjusts the speed with the right hand. By setting the speed of the shutter at exactly the speed of the moving object, the latter appears to be stationary.

Livingston & Southard, Inc., 17 Battery Place, New York City. Nov. 18, page 813.

Portable Combustion Test Set

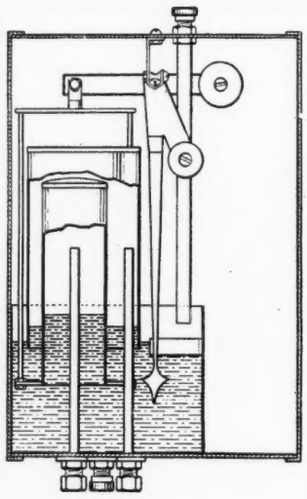
Designated Model 00, this portable combustion test set is designed especially for checking combustion conditions on boilers using oil or gas as fuel. A draft gage is mounted on the inside of the cover, as also is a flue gas thermometer graduated up to 1,000 deg. The Orsat, although securely mounted in the case, can readily be removed and hung on the wall or placed on a bench.



Defender Automatic Regulator Company, St. Louis, Mo. Oct. 7, page 589.

Differential Double-Bell Draft Gage

A differential element to measure pressure differences, minus or plus, between two points, is a feature of this gage. The movement is of the gasometer bell beam-and-pointer type, operating on three knife-edge bearings. To obtain the differential pressure two bells are used in a one-pointer element. A movable bell operates inside of a stationary bell to one side of the fulcrum. The lower absolute pressure communicates with the movable bell from the inside and the higher absolute pressure from the outside.

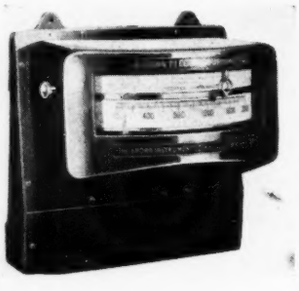


The gage is made in a variety of sizes. The small one-pointer's differential range is 1 in. It is sealed up to minus 2 in. and to plus 1½ in. The larger one-pointer gage and two- and three-pointer gages offer differential ranges of 1, 1.4 or 2 in.

Ellison Draft Gage Company, Chicago, Ill. April 8, page 566.

Pyrometer Controller

Model 801 indicating pyrometer controller combines the basic principle of the Brown automatic control recorder with a feature of mercury contacts for breaking high current. In this instrument, which can be supplied as a control pyrometer, resistance thermometer, tachometer or CO_2 meter, the reading is observed directly on a 6-in. scale. All wiring terminals and motor are completely inclosed, making the instrument safe for use in explosive or gases.

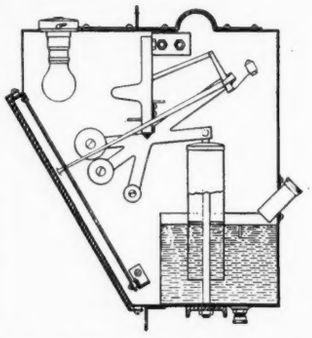


Brown Instrument Company, 4496 Wayne Ave., Philadelphia, Pa. Dec. 23, page 1025.

Tilted-Front Draft Gage

With the exception of the tilted feature, this gage is essentially of the same as the Ellison straight-line gage.

The front is tilted forward 30 deg. by advancing the pointer the same sequence ahead of the beam of the bell, which travels 20 deg. above and below the horizontal, as in the vertical-front type.

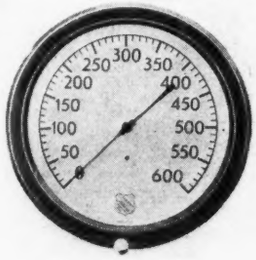


The movement consists of a system of compensating arcs and angles with all moments in counterbalance, which provides a straight-line pointer movement over the entire range of a straight scale of uniform spacings.

Ellison Draft Gage Company, Chicago, Ill. April 22, page, 648.

Gage for High Pressures and Temperatures

In the Duragage, which has been developed especially for use with high steam pressures and temperatures as well as to withstand severe vibrations and pulsations in service, the tube is bored out of special solid steel alloy, designed to give uniform expansion and contraction throughout the entire range of the gage. The sockets are made of forged steel. The pointer has an integral micrometer adjustment which makes it simple to compensate the gage for water leg in the field.



The instrument is made in

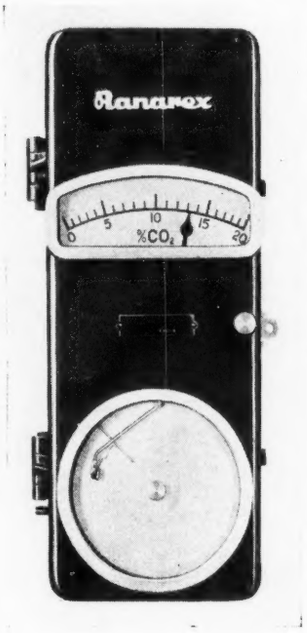
sizes from 4½ to 16 in. for all pressures up to 5,000 lb. and in certain sizes for pressures up to 10,000 pounds.

Consolidated Ashcroft Hancock Company, Inc., Bridgeport, Conn. Jan. 13, 1931, page 83.

Improved CO_2 Indicator and Recorder

In the improved Ranarex CO_2 indicator and recorder the same principle of operation as characterized the older units has been retained, but the design has been simplified and the machine made more compact. All working parts are readily accessible. The entire indicating and recording apparatus is attached to one plate, and the driving mechanism, including the motor, to another. Both plates may readily be removed.

Corrosion-resistant materials, such as bakelite and special



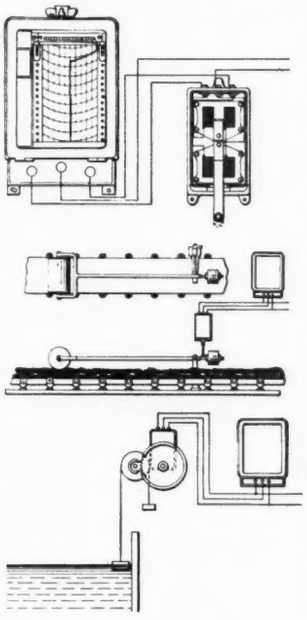
alloy steels, are used for parts in contact with flue gas. The machine is inclosed in a dust-proof aluminum casing available for wall or panel mounting.

The standard 9-in. scale and circular chart 8 in. in diameter are graduated from 0 to 20 per cent CO_2. The recording mechanism is driven interchangeably by a spring clock or an electric clock, as desired.

Permutit Company, 440 Fourth Ave., New York City. Dec. 23, page 1023.

Indicator and Recorder Position and Thickness

Graphic instruments especially adaptable to recording the position of dampers, valves, gates, etc., height of water in tanks, head of water in reservoirs and similar measurements, also the thickness of coal on a belt conveyor or of various materials in manufacturing process, are illustrated.



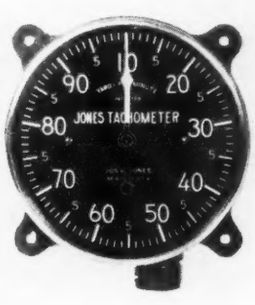
Two types of transmitters are used. One operates by a lever extending through the bottom of the case, and the other operates by the rotary motion of a shaft, the principle being the same in both cases. The rotary type is designed so that a shaft rotation of 180 deg. corresponds to full scale on the meter. The system may be operated from either 110 or 220-volt, 60-cycle circuits.

Both the electrically and mechanically operated instruments are furnished in standard switchboard, wall- and portable-type cases. Standard eight-day clocks or synchronous motor-driven clocks are available in speeds of ¾, 1½, 3, 6 and 12 in. an hour and the same per minute. Indicating meters can also be furnished.

Esterline - Angus Company, Indianapolis, Ind. April 15, page 607.

Industrial Tachometer

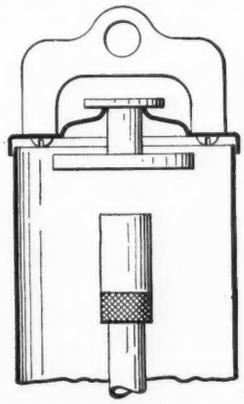
Tachometers of this type are available graduated in various units, such as yards per minute, revolutions per minute, revolutions per hour, feet per minute, and, in fact, any unit that can be indicated by such an instrument. The tachometer is arranged to be driven by gears and flexible shafting, but units can be had for belt drive.



Jones-Montrola Sales Company, 370 Gerard Ave., New York City. June 24, page 1005.

Check Seal for Draft Gages

For sealing gasometer bell-type draft gages against drawing out oil under periods of excess minus drafts, this "check seal," built into the top of the bell, consists of a double check-valve, one above and one below the bell head. On the downward movement of the bell, slightly in excess of the scale



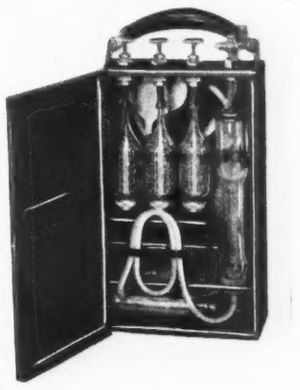
range, the disk below the bell head closes over the end of the draft tube, shuts off the draft from the bell and releases any excess through the top check. It is also installed in gages of plus readings where the pressure may change momentarily from minus to plus.

Ellison Draft Gage Company, Chicago, Ill. Dec. 23, page 1023.

Improved Portable Gas Analyzer

In this improved line of portable gas analyzers six standard ranges are available in light-weight metal carrying cases weighing 8 lb. complete and measuring 15 in. high, 7¾ in. wide and 4¼ in. deep. In addition there are three special ranges in a slightly larger case. Monel metal needle valves and removable nickel seats replace pinch clamps and glass stopcocks. After completion of a test the leveling bottle and the aspirator and tubing are clamped inside the case, the tubing being wound on reels to prevent kinking.

The instrument may be carried in any position without



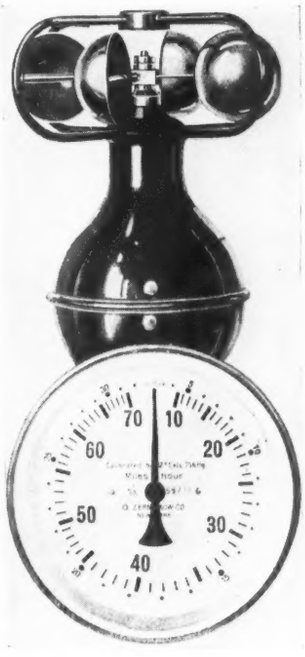
liability of spilling or mixing the solution. Owing to the method of supporting the few glass parts in the metal case, there is comparatively little danger of breakage, and all parts are readily renewable in the field.

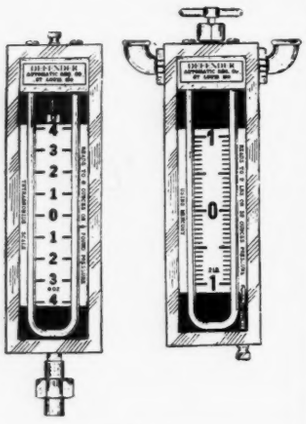
Hays Corporation, Michigan City, Ind. Feb. 4, page 191.

Anemo Tachometer

Designed to provide a convenient means of ascertaining the capacities of fans, compressors, blowers, and similar equipment, this anemo tachometer, or air-velocity meter, combines a Robinson cup-cross and a centrifugal-type tachometer. The rotation of the cup is transmitted through a ball-bearing spindle to the hand of the instrument, which has double graduation from 10 to 70 miles per hour and 5 to 35 meters per second. The size of the dial is 4 in., and the net weight of the instrument is 2 lb.

O. Zernickow Company, 15 Park Row, New York City. March 11, page 410.





U-Gage Manometers

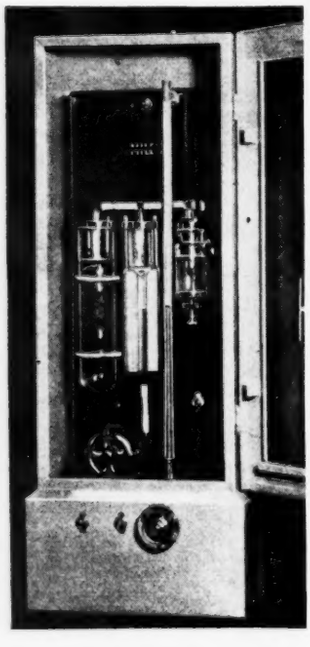
The U-Gage shown at the left is suitable for mounting on top of a gas or air line and may be turned in any direction for convenience of reading. This same model may be had with a ¼-in. back connection and with different scales.

In the manometer shown in the right-hand view, the connection is made through street ells at the top, which can be turned up or down or to any direction desired. A needle bypass valve is built into the top for use when the gage reads differential pressure or flow. Mercury is used in the gage, and a red line is painted on the back of the U-tube to facilitate reading at a distance.

Defender Automatic Regulator Company, St. Louis, Mo. Oct. 21, page 665.

Fuel-Loss Indicator

Percentage of fuel loss in any type of furnace can be read directly by this instrument,



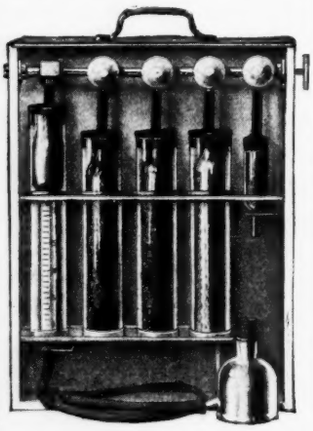
which functions on the basis of excess air in the furnace gases indicated by the carbon-dioxide content. Instead of showing the percentage of carbon-dioxide in the gases, the scale is calibrated to read directly in percentage of fuel loss. The machine consists of a measuring burette connected to a caustic potash container, a motor-driven fan to draw the gases through a sampling tube inserted in the final pass of the boiler, and a crank-operated diaphragm.

Reading at the level of the liquid is taken on the celluloid fuel-loss scale back of the burette. This scale, calibrated in percentage, reads from 0 to 78 per cent fuel loss, the zero on the scale having been based on the use of 25 per cent excess air in combustion, and the 78 per cent on the use of 590 per cent excess air.

Miles Engineering Company, 928 Fullerton Ave., Chicago, Ill. May 13, page 758.

Improved Flue Gas Analysis Instrument

Model C gas-analysis instrument is fitted with a rustless



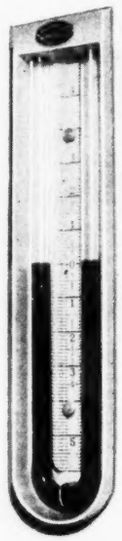
one-piece steel header with steel needle-point valves completely inclosed within the case. It is available in one-chamber and three-chamber types, on both of which the front and rear covers are slid into place from the top instead of being hinged as is the usual practice.

The header is held in place by two fittings, one at each side of the case, and a screw is fitted in the header at each end so that it can be cleaned readily while in position.

Defender Automatic Regulator Company, St. Louis, Mo. Jan. 27, 1931, page 160.

Easy-to-Read Manometer

The scale of this manometer is boldly marked to permit easy reading at a distance, and the tube itself is almost twice the diameter of the usual type. The



instrument may therefore be placed overhead or at a considerable distance from the observer. It can be used to show the pressure or flow of air, gas, steam or other liquid.

Meriam Company, 1955 West 112th St., Cleveland, Ohio. Oct. 28, page 700.

Mercury-Type Tachometer

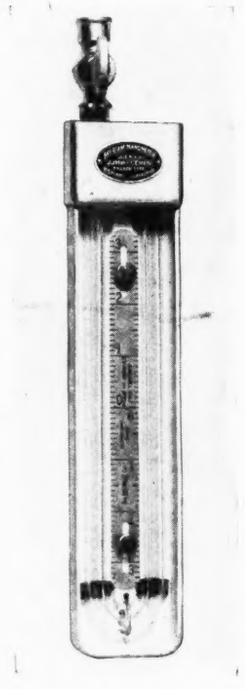
The principle of operation of this indicating and recording tachometer is that of a mercury-filled pendulum which has the form of a U-tube with a flow tube in the center. As the speed increases, mercury is forced into the leg of the U-tube, the level in the center tube falling in direct proportion to the speed. A float transmits this motion directly to the recorder and dial.

This tachometer is suitable for wide ranges in speed from zero to 4,000 r.p.m., with nearly uniform graduation of the scale. The instrument is 40 in. high and utilizes a chart 19 in. long.

Amthor Testing Instrument Company, Inc., 309 Johnson St., Brooklyn, N. Y. Sept. 2, page 402.

Manometer With Large-Bore Tube

To overcome the difficulty usually encountered in filling the tubes of manometers, this instrument has a larger bore of tube than that generally employed. The larger bore not only makes it easy to fill, but also facilitates the disengagement of air bubbles. Another



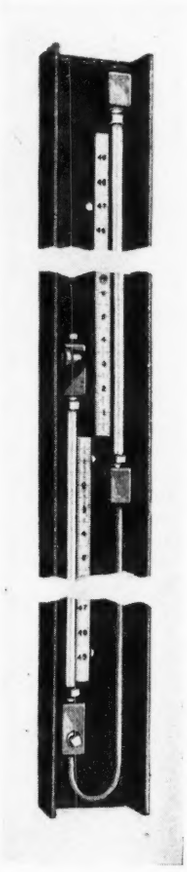
advantage of the larger bore is that the greater area largely neutralizes the capillary action of the sides of the tube.

Meriam Company, Cleveland, Ohio. March 18, page 450.

Special U-Tube Mercury Manometer

A special type of U-tube mercury column manometer designed to measure pressures up to 50 lb. is shown. It can also be furnished suitable for differentials up to 500 pounds.

Since the principle of the instrument depends upon the difference of liquid level in the two arms of the U-tube produced by the difference of pressure between the two ends of the tube, the arms must in this case be about 100 in. high. To



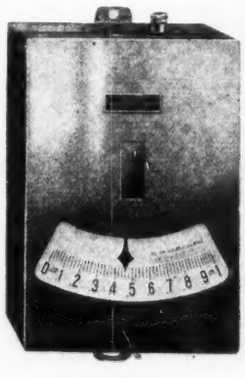
permit the manometer connecting union on the pressure side to be brought out at the middle instead of at the top of the instrument, the upper part of one of the arms is omitted, and the pressure tube is connected to a point a little above the normal zero line of the liquid, the tube being open to the atmosphere.

Meriam Company, Cleveland, Ohio. May 20, page 798.

Air Filter Gage

For indicating the differential pressure across, or the resistance through, air filters, either of the oil or air-mat type, this differential dial-type draft gage has a double-bell movement that shows when the filter needs attention.

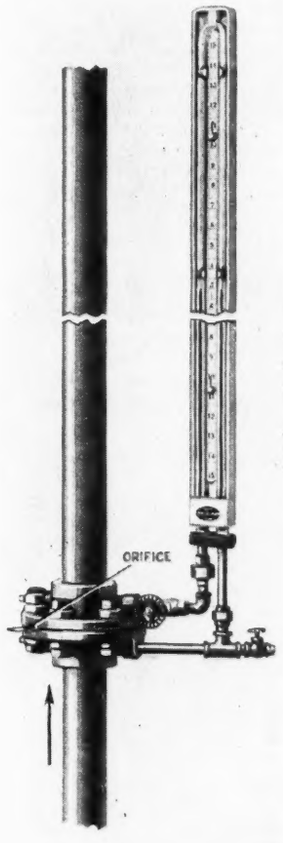
A clean filter indicates a low resistance by a low reading on the scale. As the filter gradually becomes foul, the pointer moves correspondingly over the scale until a point is reached where the filter needs cleaning.



Ellison Draft Gage Company, Chicago, Ill. April 29, page 687.

Inverted-Type Manometer

This inverted-type manometer is similar in most respects to the standard types except that the bend of the U-tube is at the top instead of at the bottom. It is connected in the usual manner—one arm of the U-tube being piped to each of the points between which the pressure is to be measured; or, in the case where rate of flow is to be found, to either side of an orifice disk.

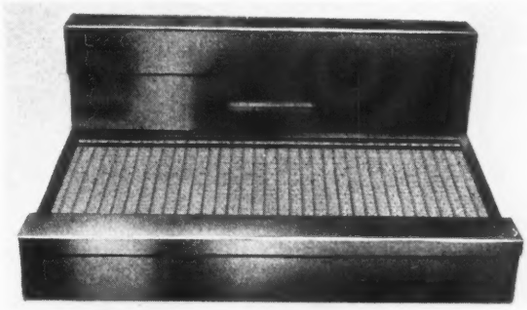


With this instrument, should the differential pressure be too great there is no mercury to be "blown over" and lost.

Meriam Company, Cleveland, Ohio. March 11, page 409.

Draft Gage With 34 Inclined Tubes

This 34-inclined-tube gage was designed to serve underfeed stokers equipped with multi-



Venturi nozzles in a common windbox. The zero end of the gage is connected with the windbox under a common pressure. At the other end of the gage each of the tubes is piped to one of the nozzles on the grate side of the damper, and is sealed up to 6-in. pressure.

The scale is 10 in. long and is provided with 1-in. sliding movement for zero adjustment. Tubes are spaced on 1-in. centers, with the scale graduated to read 1 in. differential pressure in 0.01 in. on one side of the tube, in black graduations, and on the other side of the tube to read the air flow, or square root of the differential pressure, in red graduations.

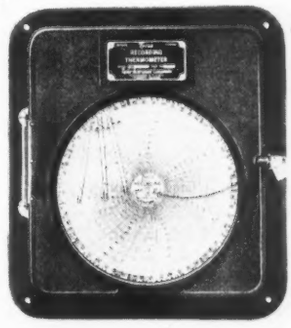
Ellison Draft Gage Company, 214 West Kinzie St., Chicago, Ill. March 11, page 410.

Thermometer and Pressure Gage

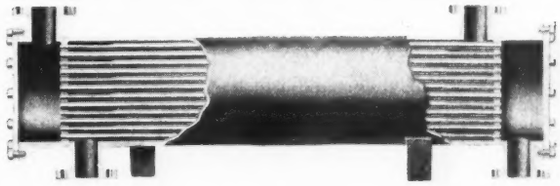
The flush-mounted recording thermometer and pressure gage illustrated is designed for panelboard mounting and can be supplied with one, two or three pens. It is back-connected, but is so designed that the operating mechanism or tube system can readily be removed from the front.

A micrometer-screw adjustment permits of accuracy of the pen, which is carried by a suspended stainless steel arm. The case regularly supplied is an aluminum casting finished dull instrument black.

Taylor Instrument Companies, Rochester, N. Y. Sept. 2, page 403.



Miscellaneous Machines and Tools



Heat Exchanger With Closely Spaced Tubes

Elimination of baffles and a material increase in the amount of surface in a given size of shell, have been made possible in the "Equaflo" exchanger by the use of tubes swaged down at one or both ends to permit closer spacing of the tubes in the shell and at the same time retain sufficient strength in the tube sheet.

Close spacing of the tubes in the shell has the additional effect of making the area of flow through the shell or across the tubes equal to the area of flow through the tubes, which heretofore has been obtained in most cases by the use of baffles.

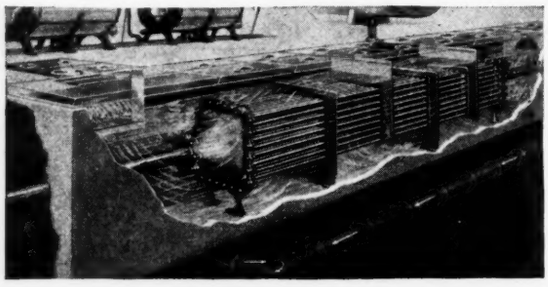
The exchanger is available in four styles or types giving various arrangements, such as with

or without floating heads, tubes swaged at one or both ends, tubes of steel or Admiralty metal and tube sheets of steel or naval bronze; and in three pressures, 75, 150 and 250 pounds.

Griscom-Russell Company, 285 Madison Ave., New York City. Feb. 18, page 266.

Heat Exchanger With Flow-Distributing Plate Valve

Full and equal use of each tube, in securing an interchange of heat from outgoing hot drain water to incoming water for process is obtained in this heat exchanger by a water-spreader plate valve at the receiving end



of the exchanger. The flat plate valve is machined on the inner surface so that it will fit tightly against the ends of the tubes.

Horizontal adjustment of the plate can be made from outside the casing to uncover the tube ends to a point where the aggregate of the free openings will correspond with the average flow through the unit.

In the installation shown the exchanger has been placed in a concrete trench under the floor. The catch basin and screen chamber remove the heavy particles of waste as it flows into the trench. The water to be heated passes counter-currently through the tubes. Tubes of 1-in. diameter are spaced in vertical and horizontal rows on 2-in. centers. The tubes may be from 6 to 20 ft. long. Capacities range from 1,000 gal. per hour up.

Gebhardt Company, Inc., 343 Dearborn St., Chicago, Ill. Oct. 21, page 664.

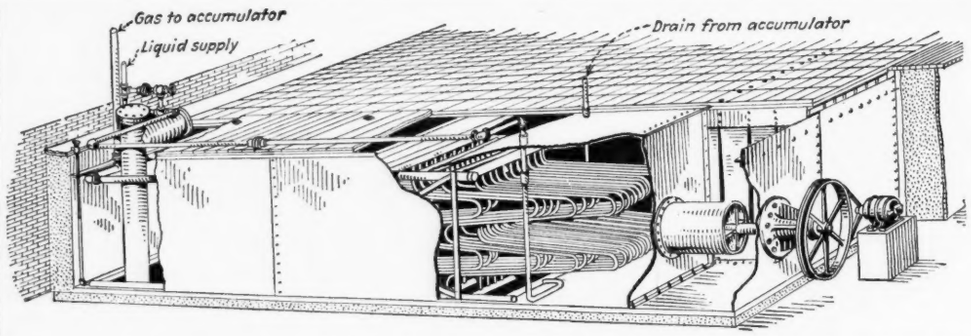
Brine-Race Freezing System for Making Ice

Acceleration of the velocity of the brine over the evaporator to about 150 ft. per minute, without adding too much to the working head and corresponding horsepower of the agitator, is made possible with this brine race system.

Banks of W-shaped pipe coils are welded at top and bottom to a series of short cross headers, which are joined, in turn, to four lengthwise headers of large size. The long headers are braced as shown, so that the whole forms a rigid, one-piece structure.

The unit is placed in the partitioned brine-race inclosure, open at the top, which extends across the short side of the tank to keep as low as possible the distance through which the brine must be moved at high velocity. The brine is directed against the upper coils of the evaporator by removable baffles set at an angle; this gives a semi-inclosed space, permitting inspection or raising of the coil unit and eliminating accumulation of frost which would form on a metal cover in complete contact with the brine. The pumping head has been so reduced that there is but 6 in. difference in the brine levels at the agitator end, compared with a head of from 18 to 24 in. in the usual design.

Frick Company, Waynesboro, Pa. April 8, page 564.



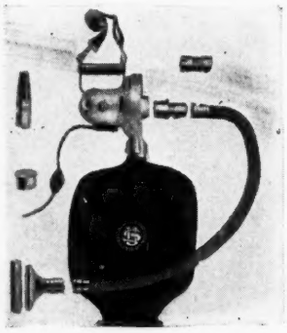
Paint-Spraying Units

This portable unit, one of four included in a complete line of paint-spraying outfits, has a 2-gal. pressure material container, and the air compressor has a displacement of 3.5 cu.ft. of air per minute. Other units, in the line include two hand-spray guns with small-capacity containers, and one larger unit with a 5-gal. container, each of which is designed to operate with compressed air produced by attaching a hose to the engine of a truck or other unit. One or more spark plugs, as required, are removed and special air pressure valves, with hose attached, are inserted. With the small hand gun one cylinder is used, and with larger units two cylinders are employed.

Binks Manufacturing Company, 3114 Carroll Ave., Chicago, Ill. Sept. 9, page 436.

Combination Portable Blower and Vacuum Cleaner

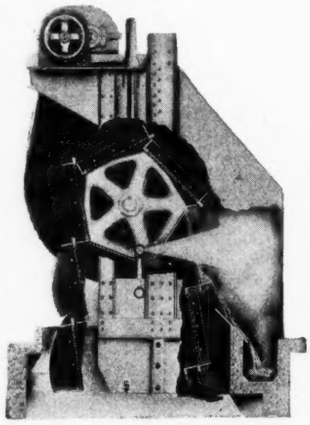
One of the features of this unit is the provision made for



changing it from a vacuum cleaner to blower by simply removing the dust bag and relocating the hose.

Made in two sizes, No. 1, with a weight of 7½ lb., and No. 2, with a weight of 9½ lb., the machine is arranged with an adjustable strap for slinging over the operator's shoulder or hanging on a hook. It is equipped with a universal motor and a quick-make-and-break switch.

United States Electrical Tool Company, Cincinnati, Ohio. June 3, page 885.

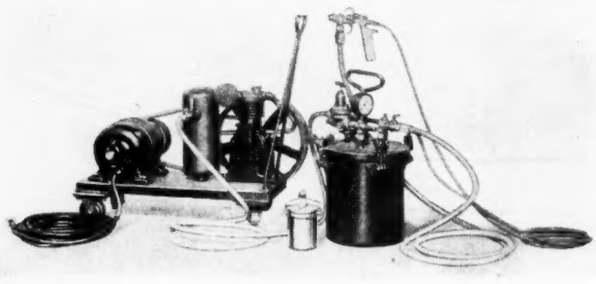


Improved Traveling Water Screen

To withstand maximum pressures the trays of this traveling screen are made of heavy-section angle irons, with one-piece frames. Another feature is the overlapping of the trays and the use of seal plates between the ends of the trays and the elevating chains to which they are secured. The front-spray method of washing the refuse from the ascending trays into a gutter is employed.

The driving arrangement consists of a motor with moisture-proof windings, a herringbone gear, fully housed speed reducer running in oil and equipped with anti-friction bearings, and a suitably guarded finished-steel roller chain drive to the screen headshaft.

Link-Belt Company, Chicago, Ill. July 8, page 72.



Lapping Compounds

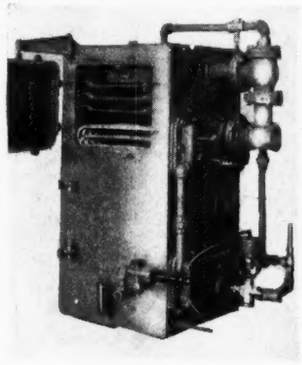
"Timesaver" lapping compounds may be used for fitting either new or reconditioned bearings, and are said to produce smooth, open-pored surfaces which retain the oil film. These features make the material suitable for finishing of

valve seat and disks, cylinder walls, bearings and like work. No. 60 compound is used for babbit and similar soft-bearing metals, No. 80 for bronze and No. 111 for cast iron. The compounds are available in 1½-oz. and 3-oz. and 1-, 5-, 10-, 25- and 50-lb. containers.

Abrasive Engineering Laboratories, Inc., 117 North Jefferson St., Chicago, Ill. July 29, page 193.

Deaërating Heater With Thermostatic Control

Water admitted to this deaërating heater by a float-control regulating valve passes over trays in the upper chamber, where it is heated to within about 2 deg. of the boiling point by direct contact with steam admitted through a reducing valve. The water falls into a basin below the pans, where it is heated by steam coils to a temperature slightly above the boiling point to drive off air and gases. It then overflows and



passes down a conductor pipe to the lower water chamber, where it is cooled down to the desired temperature, which is usually 160 to 180 degrees.

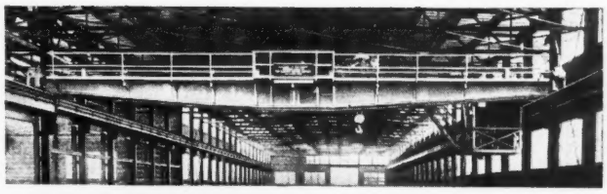
Air and gases liberated in the heater are drawn off from the lower chamber and pass through a pipe to a vent condenser. These heaters are also built for indirect heating, in which case the coil is made large enough to heat the water to the deaërating temperature.

Hoppes Manufacturing Company, Springfield, Ohio. May 13, page 758.

Crane of Aluminum Alloy

This aluminum alloy crane is a three-motor, single-hook machine with a lift of 22 ft. The bridge is fabricated from two double-web girders spaced 7 ft. on centers. The girders are constructed of strong aluminum alloys, and have a span of 72 ft. 2 in. Aluminum is also used in the walkway, hand rails and operator's cage.

Design of the aluminum alloy



crane is based largely upon the usual practice followed in building steel cranes, although with certain departures. The girders are made with a section somewhat deeper, wider and greater in area and with about twice as much camber as is generally employed on the steel girders.

Tests made for deflections under load indicated that the deflection of the aluminum alloy crane was about 1.8 times as much as that of the steel crane when a 25 per cent overload was applied at the center of the span, and when subjected to a load of 34,500 lb., or a 72.5 per cent overload, there was a deflection of only 1.09 in.

Alliance Machine Company, Alliance, Ohio. March 25, page 488.

Airplane-Propeller-Type Fan

Designated "Aerospot," this line of industrial propeller-type fans is put out in three models. Model A is fitted with a 42-in. fan driven by a 2-hp., 3-phase, 60-cycle, 1,750-r.p.m., 110- or 220-volt motor with built-in switch. Model B is equipped with a 36-in. fan and a 1-hp. motor, and Model C with a 30-in. fan and a ½-hp. motor.

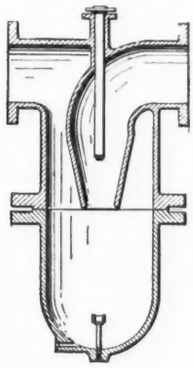
The propeller is made with a core of white birch, laminated and matched to eliminate vibration; then completely incased in

heavy-gage Monel sheathing and hermetically sealed. Bases are of heavy-gage angle iron or piping, and the fans are incased in cages of heavy-gage galvanized wire.

American Propeller Company, Inc., 220 Grindall St., Baltimore, Md. June 17, page 963.

Desuperheater With Thermo-Hydraulic Governor

The principle of atomization as used in the automobile carburetor is employed in this de-



superheater, which is available in standard pipe sizes from 3 to 24 in., inclusive, and for three standard pressures, 250, 400 and 600 pounds.

Steam enters a throat tube in the center of the desuperheater, where it is met by a conical stream of cooling water introduced through a central pipe.

The temperature of the steam leaving the desuperheater is controlled automatically by a desuperheater governor inserted in the water line, with the generator for the governor located in the discharge steam line. To meet conditions where the pressure must be reduced as well as the temperature, a complete reducing and desuperheating station is available.

Swartwout Company, 18511 Euclid Ave., Cleveland, Ohio. Jan. 27, 1931, page 160.

Hardened Copper Alloy

As a substitute for phosphor bronze, manganese bronze and gunmetal, this product, known as "P.M.G." metal, is a hardened copper alloy in which the 10 per cent tin is replaced by 10 per cent of a special hardener. It is especially suitable for use where high-tense strength, and resistance to abrasion are required.

Driver-Harris Company, Harrison, N. J. June 10, page 922.

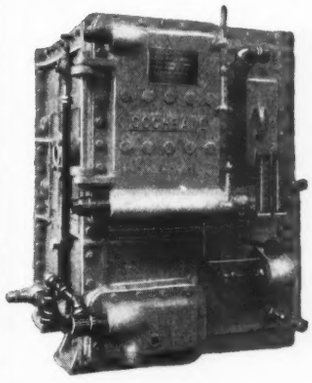
Self-Contained Deaerating Heater

In this deaërating heater the raw cold water first enters a vent condenser, from which it passes through a tubular preheater to the control valve, then to deaërating trays in the upper part of the shell.

The steam enters the preheater through a valve controlled by a thermostat subject to the temperature of the water leaving the preheater. It also enters the evaporator coil, located in the storage space, through a valve controlled by a thermostat. Steam admitted to the evaporator being hotter than the water in the storage space, generates steam from the latter, which rises through the trays over which the heated incoming water is flowing, sweeping out the gases liberated from the water. The mixture of air and gases rising from the tray stack passes into a vent condenser, where the steam is condensed and its heat recovered by incoming cold water.

The shell of the deaërator is built for pressures varying from a complete vacuum up to 10 lb. gage, and standard deaërators are designed to receive water at 40 to 70 deg. F. and to deliver it at 150 to 180 deg. F. for any temperature up to 235 deg. F.

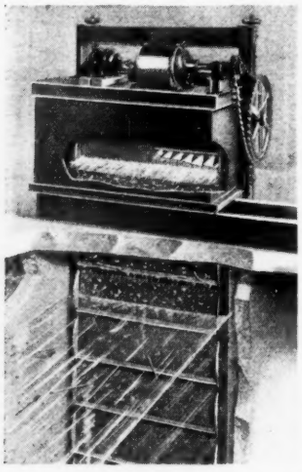
Cochrane Corporation, Philadelphia, Pa. April 29, page 685.



Traveling Water Screen With Improved Basket

While the general principle of traveling water screens is embodied in this unit, it is designed to occupy less space for a given capacity than previous models and to give accurate sealing at the side of the screen.

Two major improvements made to this unit over previous models are new basket design and a new base. The rectangular baskets hold the screen cloth, and are, in turn, carried by two strands of hardened steel roller



chain. The refuse is lifted from the intake by the upward travel of the baskets and is automatically washed into a trough by a high-pressure spray of water.

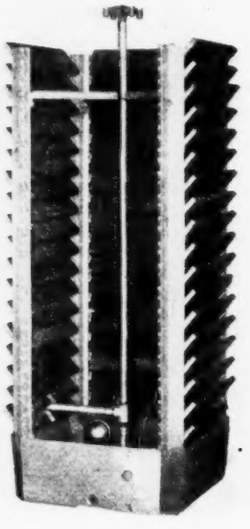
The new design of the foot wheel permits the use of the new extended track shoe. The latter engages the roller the instant it leaves the wheel. As a result there is no intervening space in which the roller can weave inward and cause openings between the ends of the baskets and the frame of the screen.

Chain Belt Company, Milwaukee, Wis. April 8, page 565.

Small Spray Cooling Tower

Where the capacity required does not exceed 10 to 12 gal. per minute this type G spray cooling tower can be used for cooling jacket water of diesel engines and in small refrigerating plants and other installations.

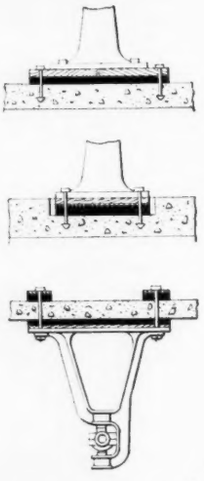
Cast iron is used in the construction wherever possible. The louvers, of California redwood, are a slip fit in the corner posts, no screws or nails being used to hold them in place. A group of spray nozzles is mounted on a central pipe a short distance above the top of the tower. Dimensions of the tower are, maximum width, 36 in.; height, 7 ft. Water storage is 38 gallons.

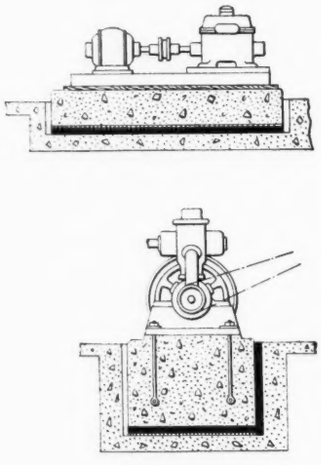


Marley Company, 1737 Walnut St., Kansas City, Mo. Aug. 12, page 266.

Vibration-Insulating and Soundproofing Material

Like rubber, this material, known as Keldur, deadens noise and checks vibration, but it is not subject to deterioration in the presence of oil, and will not harden. The material can be used for both light and heavy equipment, also as a soundproofing material for doors and walls and as a floor covering over concrete.



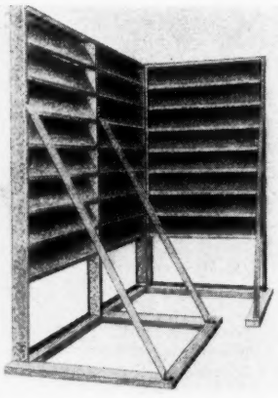


It comes in sheets 28x36 in. or 29½x40 in., and in thicknesses of ¼, ⅜ and ¾ inch. One square foot of the ⅜-in. material weighs 3½ lb. Several sections can be laid side by side if one sheet is insufficient to cover the base of a machine. Two thicknesses of the material are used where vibrations are particularly severe. When the material is used in walls or in concrete foundation, as in supporting heavy machines, it is inclosed in tar paper to prevent moisture from penetrating.

International Products Corporation, 425 Van Buren St., Milwaukee, Wis. June 10, page 921.

Sectional Steel Louver Fencing for Spray Ponds

This sectional steel louver fencing is available in standard sections 5 ft. wide and in 9, 12 and 14 ft. heights. Narrow sections ranging in widths from 2 to 4 ft. are also available.



The framework of the fence is made up of 16-gage heavily galvanized material, with 18-gage louver plates riveted in position. Each section is furnished complete, ready for installing and provided with a series of holes on each side of the frame so that adjustments can be made for the pitch of the roof. The 9-ft. fence is said to give ample drift spray protection for the average installation, the 12-ft. fence being for special applications. The 14-ft. fence is used on double-deck spray ponds where nozzles must necessarily be elevated considerable distance above the spray deck.

Binks Manufacturing Company, 3114 Carroll Ave., Chicago, Ill. Dec. 23, page 1024.

Phosphate for Water Conditioning

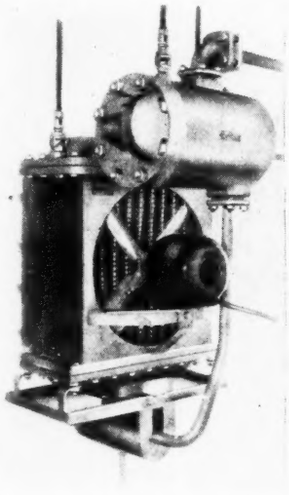
Known as Hagan phosphate, this new chemical for boiler-water conditioning is claimed to overcome the inherent problems encountered in the use of tri-, di- and monosodium phosphates for water conditioning. Claims made for the new chemical are: It provides phosphate as a suitable negative radical necessary for scale prevention; enables the proper alkalinity to be given the feed water to protect feed lines, economizers, etc., from corrosion; and reacts in the boiler proper to reduce alkalinity as a protection from embrittlement and wet steam. It can be put into the feed-water system of the plant without precipitating calcium and plugging up feed lines, valves, etc. It is readily soluble in water and in its commercial form its analysis is definite and unvarying.

Hagan Corporation, Pittsburgh, Pa. Feb. 18, page 267.

Unit Cooler for Refrigeration

Designed especially for refrigeration and for use with direct-expansion ammonia, brine and other refrigerants, this unit cooler takes the place of the conventional pipe-coil system used in storage boxes and other rooms where refrigeration is required.

The design incorporates straight, short tubes of seamless steel placed vertically to avoid gas-locking. Tubes have radiating fins with collars pressed on. All parts of the cooler are rust-proofed or processed to prevent corrosion. A totally inclosed ball-bearing motor drives the fan, which has a steel processed hub and aluminum blades. A specially designed liquid-level control automatically maintains a positive level of ammonia or other refrigerant in the cooler. Overall dimensions of the unit, including drip pans, are 23 in. deep, 23½ in. wide and 42 in. high.



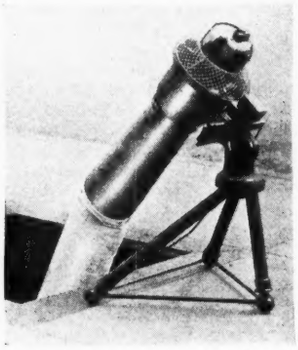
Grinnell Company, 260 West Exchange St., Providence, R. I. Nov. 18, page 813.

Small Portable Ventilating Unit

Although designed primarily for ventilating cable manholes, this portable blower is equally suitable for ventilating under-

ground passages in power plants, coal pockets, and for various other uses of cooling and drying.

It consists of a vano-type blower driven by a ½-hp. motor, the whole being mounted on a



tripod with swivel joint. The diffuser outlet can be directed in a number of positions, and an 8-in. ventube (canvas tubing) is readily slipped over the outlet. The unit weighs 115 lb.

Coppus Engineering Corporation, Worcester, Mass. July 22, page 154.

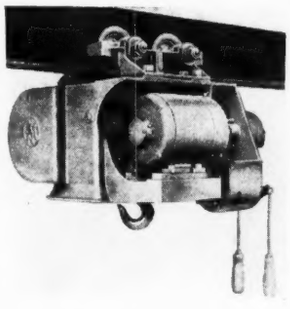
Electric Hoists in Capacities Up to 7½ Tons

Ranging in sizes from ½ to 7½ tons capacity, this line of electric hoists has a cast-steel trolley adjustable to nine sizes of I-beams carrying a main frame of Aremite alloy metal, which, it is claimed, has a tensile strength of 35,000 lb., or more than double that of gray iron, with an elasticity which enables it to withstand severe shocks in service.

An inclosed-bottom block designed to retain the rope on the sheaves under all conditions of service has all parts shrouded so as to guide itself easily into the rope flare when swinging.

The motor used on all sizes is of the totally inclosed, ball-bearing high-torque type. A rope-operated controller is fitted with a spring which automatically returns the controller to the off position when the rope is released.

Hoist & Crane Division of Robbins & Myers, Inc., Springfield, Ohio. March 18, page 449.



High-Temperature Heat Insulation

A high-temperature heat-insulating material known as "Carey Aluminite" is derived from bauxite, the ore from which aluminum metal is produced. It is designed for use in connection with firebrick boiler settings, heat-treating furnaces, regenerator chambers in iron, steel and other industries, and similar structures where internal temperatures range from 1,800 to 2,600 degrees.

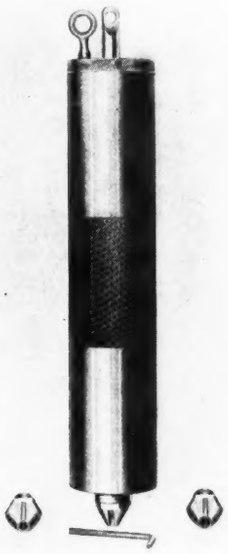
Blocks for temperatures up to 2,000 deg. are now available. These are being made in one standard size 9 in. wide, 36 in. long and 2½ in. thick.

Philip Carey Company, Lockland, Cincinnati, Ohio. June 24, page 1004.

Liquid Sampler

This sampler consists of a hollow metal cylinder 13½ in. in length, made of non-sparking metal. A close-fitting piston operates within the cylinder. Interchangeable nozzles for handling liquids of varied viscosity are provided for the outlet in the lower end of the cylinder.

To operate, the sampler is lowered into the tank to the desired depth by means of a chain. Liquid is drawn into the lower



third of the chamber by pulling the chain attached to the plunger. The sampler is then raised to a second and a third position, where successive samples are obtained in the same manner, filling the sampler to its full capacity of 32 ounces. An indicator on the rod shows when each portion is filled with liquid.

Hills-McCanna Company, 2349 Nelson St., Chicago, Ill. July 15, page 113.

Stainless-Steel Lock Washers

Lock washers of stainless steel in any size or section have been made available. In addition to having all the qualities of a non-corrosive stainless steel, they are of a spring temper equal to that of the ordinary steel lock washer. Stainless steels in coils, or straightened and cut to length in any small-section round, flat, square or hexagon are also available.

Reliance Manufacturing Company, Massillon, Ohio. May 20, page 799.

Portable Industrial Vacuum Cleaner

For heavy-duty work in cleaning machinery, motors, overhead pipes, girders and other in-

dustrial applications, the Model 70 "Tornado" industrial vacuum cleaner is especially suitable. It is equipped with universal ball-bearing motor mounted on a cast aluminum cover which fits over a steel tank. The motor can be removed and used as a portable blower.

Breuer Electric Manufacturing Company, 852 Blackhawk St., Chicago, Ill. April 22, page 648.

New Water-Softening Zeolite

Known as "Basex," this zeolite is said to require only ten minutes' time for complete regeneration, possesses an extremely high base exchange value and consumes a low quantity of salt for its regeneration. It is suitable for replacement in all makes of zeolite water softeners operating on either the up-flow or down-flow principle. With an effective size of 0.36 millimeters and a uniformity coefficient of 1.40, it permits high rates of flow and minimum pressure losses. It is furnished in 150-lb. bags.

Inversand Company of Hungerford & Terry, Inc., Clayton, N. J. March 4, page 373.

Tractor-Mounted Swing Crane With Air Compressor

In the latest design of this tractor-mounted swing crane the tractor frame has been extended to carry a 160-cu.ft. two-cylinder air compressor arranged to be driven from the tractor motor. A receiver is carried on the side. The complete unit is mounted on a 16-20 industrial tractor and is fitted with a 10-, 12- or 14-ft. boom, as required. The crane is rated at 3,500 lb. capacity and is adaptable to a variety of work as well as furnishing compressed air.

Frederick H. Poor, Inc., 342 Madison Ave., New York City. Jan. 20, 1931, page 123.

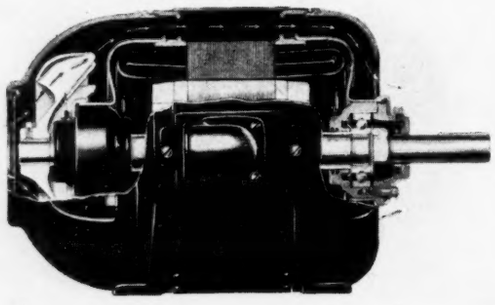
Heat Killer for Industrial Uses

Two types of airplane heat killers now available are designed to give a large volume of air at low velocity, No. 1 having a capacity of 10,500 c.f.m. at a velocity around 2,600 ft. per minute, and No. 2 a capacity of 15,600 c.f.m. at a velocity of 3,850 ft. per minute. To prevent recirculation and improve the operating characteristics, each unit has both an inlet thimble and a diffuser whereby both incoming and outgoing air are guided.

Coppus Engineering Corporation, Worcester, Mass. May 13, page 759.

Motors, Electrical and Elevator Equipment

Totally enclosed motors with improved methods of cooling, units with supporting feet on the end bell instead of the stator, a redesigned line of synchronous motors in sizes up to 10,000 hp., automatic power-factor control unit and compact starters with parts more accessible are some of the recent contributions



Inclosed Motors With External Cooling Fan

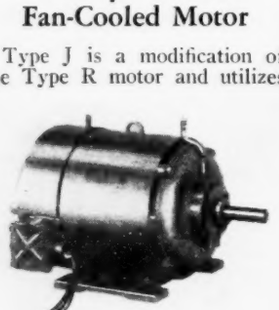
This line of dust-tight totally inclosed fan-cooled induction motors provides a totally inclosed motor of the same mounting dimensions, rating for rating, as the standard G.E. open-type, horizontal, general-purpose motor, from ¾ to 50 hp. These motors are equipped with ball bearings, in "cartridge" housings, and utilize a single ventilating fan located outside the inclosure on a short shaft extension. A double frame provides air passages for the ventilating air.

The dust-tight, cartridge-type ball-bearing housing permits removal of the rotor without exposing the bearings to dust or dirt.

General Electric Company, Schenectady, N. Y. Dec. 23, page 1024.

Totally Inclosed Fan-Cooled Motor

Type J is a modification of the Type R motor and utilizes similar methods of inclosing and ventilating. Additional refinements include "cartridge-type" bearing chambers and simple devices for removing the fan, ventilating shell and heads quickly.

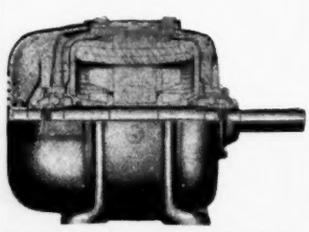


The motor is sealed inside a sheet-steel ventilating shell, and all bearing chambers are within the inclosure, thus utilizing the oil seals and fits of the cartridges around the shaft to exclude foreign matter. The motor is available in sizes of 3 to 100 horsepower.

Louis Allis Company, Milwaukee, Wis. Jan. 13, 1931, page 83.

Sealed Metal Housing-Incased Motor

Especially suitable for use in industries where dangerous



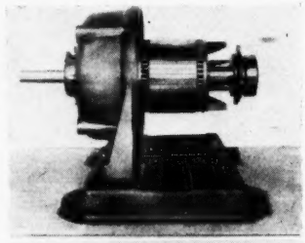
fumes, moisture, abrasive-laden air or dripping acids or alkalies are prevalent, this motor is incased in a sealed metal housing outside of which is a chamber that is air-blasted by positive fan action. As air is forced through the chamber any dust, dirt or moisture are immediately expelled from the outer casing, thus preventing any foreign matter from entering the inner motor casing. The motor is equipped with ball bearings and asbestos-insulated windings.

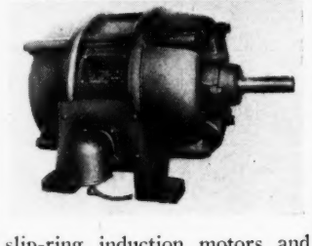
United States Electrical Manufacturing Company, Los Angeles, Calif. April 15, page 607.

Unit-Type Induction Motor

In the "unit-type" motor shown, put out in sizes from ½ to 200 hp., the motor feet are on the bearing brackets instead of the stator, as is the usual practice. With this construction all load shocks and strains are carried directly to the motor support. This construction also facilitates inspection and cleaning, for when the front end bracket and stator are removed the pulley end bearing bracket remaining bolted to the base will still support the rotor and gear, pulley or other connection to the driven unit.

The motors are built with standardized units (rotors and stators) which are interchangeable for all types, including squirrel-cage induction motors,



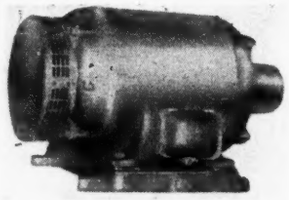


slip-ring induction motors and direct-current motors. Interchangeable ball, roller or sleeve anti-friction bearings are standard.

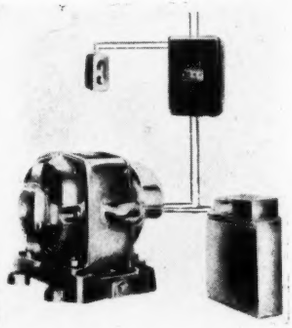
Ideal Electric & Manufacturing Company, Mansfield, Ohio. Jan. 6, 1931, page 44.

Totally Inclosed Fan-Cooled Motor

The fan and its housings are externally mounted on the front end of this totally inclosed motor. Cooling air is drawn in at the pulley end, circulated through air-passages between the field core and the frame and out over the coil guard on the front end. The fan blades are radial, so that it is equally effective regardless of the direction of rotation. Circulated air within the motor serves as the heat-transferring medium from the motor proper to the protecting shell. As all the internal parts of the motor are tightly sealed against dust, compressed air can be used to blow out the cooling-air passages.



Century Electric Company, St. Louis, Mo. March 11, page 408.



Single-Phase Capacitor Motors

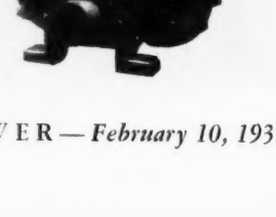
Although classified as a single-phase machine, this unit is a modified two-phase squirrel-cage motor with a capacitor in series with one phase of the stator windings. The capacitor remains in the circuit throughout starting and running, so that full-voltage manual or magnetic control only is required.

Available ratings in the line are from 1 to 25 hp., inclusive, at 3,600, 1,800, 1,200 and 900 r.p.m. constant speed, with starting torque from 60 to 40 per cent of full-load running torque, depending upon speed.

General Electric Company. Feb. 4, page 192.

Improved Design Semi-Inclosed Motor

Baffles on the bearing brackets direct the air around the stator windings, and the end bells are so designed that the



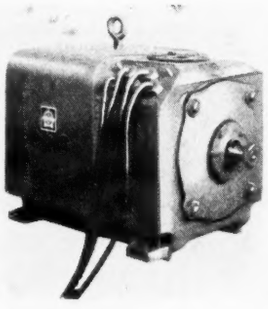
air-current sweeps over the outer face of the stator laminations. The outside flanges of the end rings are carried out some distance over the lamination to prevent dirt from falling into the air pasages.

The new construction is now furnished as standard in squirrel-cage and slip-ring motors, both of the ball-bearing and sleeve-bearing types, for general-purpose multi-speed or elevator applications. This motor can be used on either 2 or 3 phases without any magnetic hum.

Cleveland Electric Motor Company, Cleveland, Ohio. May 20, page 799.

Explosion-Proof Direct-Current Motor

Of unusually heavy construction and tightly sealed against leakage of air or gas, this motor is so constructed that even if an explosive mixture of gas and air should leak inside



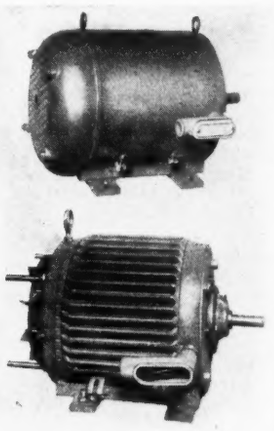
and explode, the motor will withstand the shock and not communicate sparks and flame to the outer air.

Special attention has been given to sealing the motor leads where they come through the housing, and the shaft bearings.

Reliance Electric & Engineering Company, 1042 Ivanhoe Road, Cleveland, Ohio. Jan. 6, 1931, page 45.

Totally Inclosed Fan-Cooled Induction Motor

A large radiating surface is obtained in this totally inclosed fan-cooled induction motor by complete inclosure of the sides with a deeply corrugated sheet of corrosion-resisting metal. The air imprisoned within the sealed frame is constantly circulated by a fan attached to the rotor. This fan drives the heated air within the motor to continuous contact with the corrugated cooling surface. Outside air to absorb the heat from the radiating surface is forced across the exterior of the corrugated surface by a fan on the motor shaft. The corrugated cooling surface is easily accessible for cleaning by removing the one-piece cover.



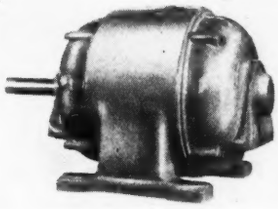
The motor has the same mounting dimensions as standard, open-type machines of equal rating. It is available in sizes from 1 to 50 horsepower.

Lincoln Electric Company, Cleveland, Ohio. Jan. 6, 1931, page 44.

Motors With Herringbone Rotors

Motors from 1 to 50 hp. are now available equipped with herringbone rotors to achieve quiet operation. These motors are especially suitable for such applications as ventilating fans, direct-connected pumps or other applications where quiet performance is important.

The herringbone rotor design, according to the manufacturer,



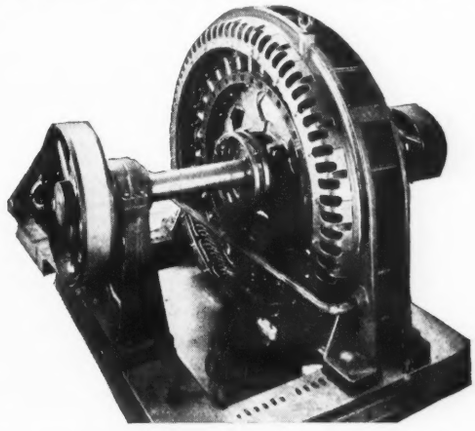
gives noiseless operation; improved pull-out efficiency and power factor; and reduced starting current and iron losses. Mica and asbestos are used to insulate the windings.

Sterling Electric Motors, Inc., Telegraph Road at Atlantic Blvd., Los Angeles, Calif. Jan. 27, 1931, page 162.

Synchronous Motors in Sizes Up to 10,000 Hp.

A number of refinements in synchronous motor design have been incorporated in this line, which covers a range of ratings from 20 to 10,000 hp.

The stator has cast semi-steel skeleton frame ends of nutless, boltless and threadless construction. Laminations in the stator are stacked on circular threadless stacking pins and compressed under high pressure, the stacking pins being finally welded to form a flat countersunk head. Laminations of the polepieces are also assembled under high pressure and are securely riveted together. In all except the smaller sizes the field coils are made of copper strap wound on edge. End ring connectors are arranged to permit of removing any pole without disturbing the others, and the connectors between poles are shaped to provide additional ventilation for both the rotor and stator. The smaller and intermediate sizes are fitted with ball bearings, and the larger slow-speed machines with spherical bearings. Some of the electrical characteristics embodied in these motors are high efficiencies at full and part load, and high starting and pulling torques.



Fairbanks, Morse & Company, Chicago, Ill. Sept. 23, page 514.

Control Unit for Synchronous Motor-Generators

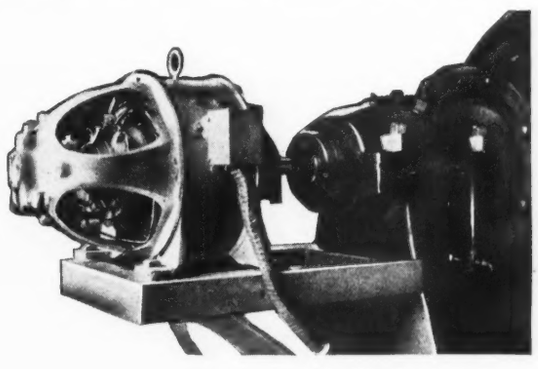
In the Melton control, designed to maintain an even and uniform power factor on a synchronous motor-generator set, an exciter is directly connected to the main generator shaft, with the fields so connected that any change of the main generator load automatically increases or decreases the excitation of the synchronous motor. The armature of the exciter is permanently connected through the rheostat to the fields of the synchronous motor. The shunt fields are connected through a rheostat to the direct-current busbar, and the series fields, which are connected compound, receive their energy from a special shunt in the main negative lead of the generator.

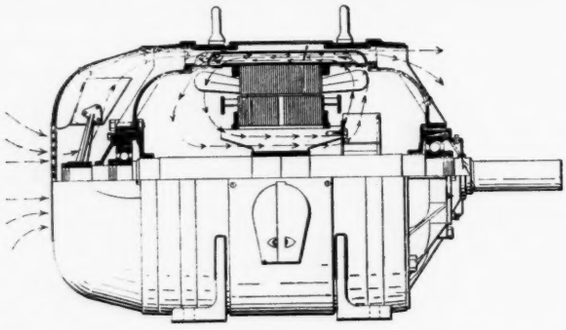
With this system the excitation of the synchronous motor is varied from approximately 50 to 150 per cent of the rated field current, the exciting current being automatically reduced below normal at low loads and raised about normal during momentary or sustained overloads. This variable excitation limits the amount of wattless component furnished by the synchronous motor, which, in turn, permits the desired constant power factor. The control operates without relays, solenoids or series-torque motor with resistance.

Melton Control Company, Punxsutawney, Pa. Jan. 20, 1931, page 120.

New Principle of Cooling for Motors

With the Mossay principle of cooling employed for these motors, in sizes from 20 to 150 hp., the extra cooling surface is obtained by use of tubes ex-





tending over the outside of the stator. A single internal fan on the rotor circulates the confined warm air through the tubes, over which are blown blasts of cool outside air from one end of the motor to the other. The stator inclosing band, which prevents the escape of the cooling air, is readily removed for cleaning of the tubes.

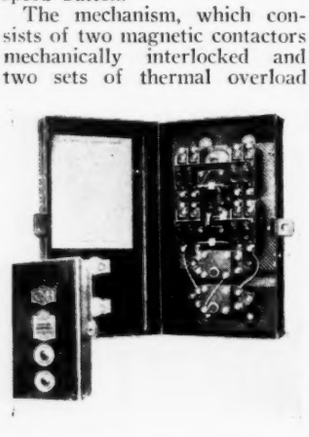
The stator windings and rotor are tightly inclosed. The fits for all inclosing parts are machined surfaces. All seals are stationary. In dismantling, the only extra parts to remove, in addition to those of the standard open motor, are the external fan guard and fan.

Reliance Electric & Engineering Company, Cleveland, Ohio. Sept. 30, page 550.

Automatic Starters for A.-C. Multi-Speed Motors

Three types of this automatic starter for two-speed separate-winding squirrel-cage motors are available for starting on either winding, with sequence-compelling feature or with automatic sequence-control relay. The automatic sequence-control relay insures that the motor will always start at low speed and pass to high speed automatically if the "high" button is depressed. On all three types, if the motor is operating at one speed it can be transferred to the other speed by simply depressing the other speed button.

The mechanism, which consists of two magnetic contactors mechanically interlocked and two sets of thermal overload relays, is mounted in a split-type inclosing case.



Cutler-Hammer, Inc., 190 12th St., Milwaukee, Wis. Oct. 7, page 589.

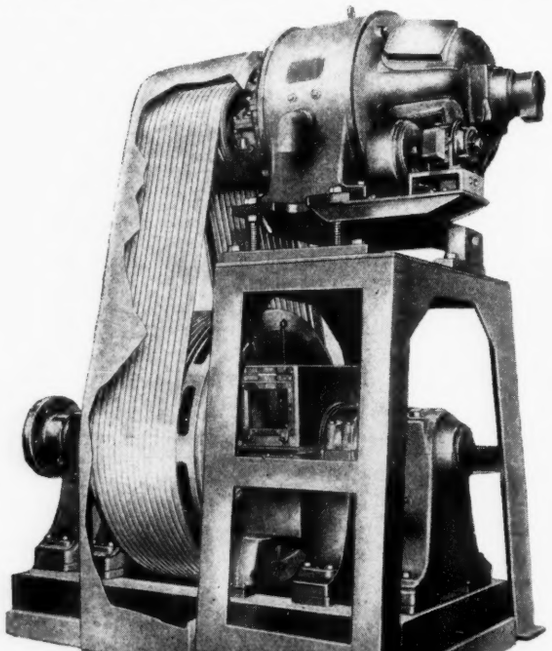
Speed Control System for A. C. Motors

The Rossman system of speed control for power station auxiliaries is designed to give a wide speed range and a good speed regulation characteristic.

Two 2-machine units are used, a drive unit and a regulating unit. The drive comprises a constant-speed induction or synchronous alternating-current motor and an adjustable-speed direct-current motor. The alternating-current motor differs mechanically from standard types in that both the rotor and stator are free to rotate about their common axis. The rotor is connected to the load, and the frame to the direct-current motor. Current is delivered to the alternating-current motor windings through collector rings.

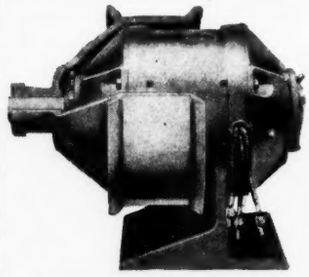
The regulating unit is a standard motor-generator set with the direct-current machine arranged for voltage adjustment between zero and maximum, in either a positive or a negative direction. The direct-current regulating machine acts as a generator or motor, depending on whether the main induction motor is operating above or below synchronous speed.

When its frame is at rest the alternating-current drive motor acts as a standard machine running at rated speed. If a higher load speed is desired the direct-current voltage is built up by increasing the excitation of the direct-current regulating machine, which then delivers energy to the direct-current drive machine. The latter then acts as a motor to drive the alternating-current motor's frame in the same direction as the rotor. With constant field excitation the direct-current drive machine tends to rotate at a speed in direct proportion to the voltage impressed on its terminals. The speed of the frame, and, hence, the increase in speed of the load, is thus built up in the same proportion.



Mechanical connection between the two machines of the drive unit may be one of several different forms. The direct-current machine may be direct connected to the rotating frame, it may be connected through multiple V-belts, or it may be belt, gear or chain driven.

Allis-Chalmers Manufacturing Company, Milwaukee, Wis. Aug. 19, page 282.



Motor With Special Support and Pulley

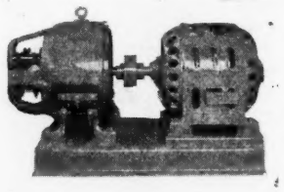
With a pulley-type roller keyed to the shaft rotating around the body of the motor, this unit is adaptable to a variety of uses in the industrial field, as rollers or pulleys of various shapes can be used.

The motor is fully inclosed and is provided with asbestos and mica insulation to withstand high temperatures. Large ball bearings are employed, and space requirements are reduced to a minimum by having the roller or pulley rotate around the body of the motor.

Reliance Electric & Engineering Company. Cleveland, Ohio. July 1, page 37.

Motor-Generator Bases of Welded Steel Plate

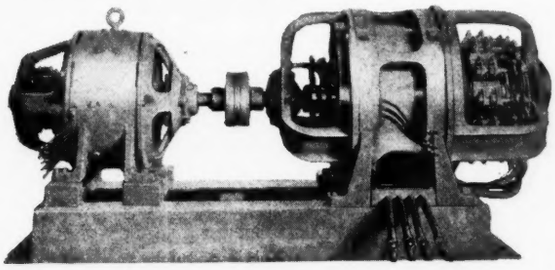
Bases constructed from heavy steel plate electrically welded are now standard on motor-generator sets in sizes up to 250 kw. Tops and ends of the bases are completely closed to prevent dirt collecting beneath the base. Such shims as are needed are placed between the pads and the base. Horizontal alignment is maintained by the use of dowels.



Reliance Electric & Engineering Company, Cleveland, Ohio. March 4, page 372.

Converters for Low-Frequency Currents

For obtaining frequencies different from those generally available, a line of special frequency converters has been developed. The machines are built for operation on either two- or three-phase circuits and to give single- two- and three-phase current at frequencies ranging from three cycles up-

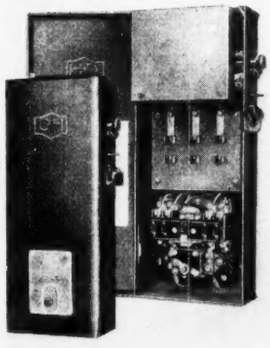


ward. They can also be used to obtain variations in speeds with squirrel-cage induction motors and to get speeds either higher or lower than can be obtained from induction motors on a standard frequency.

Reliance Electric & Engineering Company. Cleveland, Ohio. April 29, page 685.

Motor Starter With Fusible Switch

A wiring channel is provided in this combined across-the-line starter and fusible disconnect switch between the starter panel and the back of the steel inclosing case which allows running the connecting wires behind the panel, where they cannot interfere with the operation of the starter.

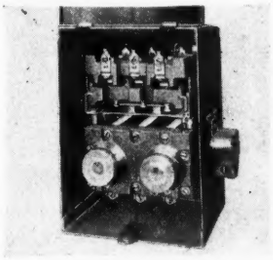


All parts are mounted on a back plate which is easily removed for pulling and placing of line and motor wiring. The disconnect switch is manually operated from the outside. A cover interlock prevents opening of the cover when the switch is closed and prevents closure of the switch if the cover is open, unless the interlock is manually released.

Cutler-Hammer, Inc., Milwaukee, Wis. July 29, page 192.

Starter With Air-Break Contacts

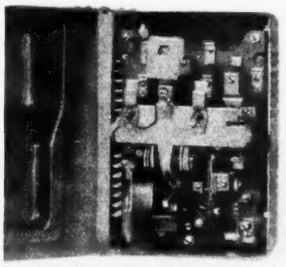
In type A-15 manually operated motor starter with air-break contacts the contacts are assembled in units on insulated carrier bases, one stationary and the other movable. The movable contact base can be withdrawn without the use of tools, permitting of ready inspection of both movable and stationary contacts, which are identical and interchangeable. Thermal cut-outs are provided for time-lag overload protection. Sizes available are for 7½ hp. at 550 and 440 volts, 5 hp. at 220 volts, and 3 hp. at 110 volts.



Condit Electrical Manufacturing Corporation, Boston, Mass. July 15, page 115.

Remote-Controlled Timestarters

This line of remote-controlled, magnetic starters for constant- and adjustable-speed direct-current motors in sizes up to 10 hp., 230 volts, includes four combinations. Class 8512-A, for constant-speed motors, does not provide overload protection or dynamic braking. Class 8512-B provides thermal relay overload protection but not dynamic braking. Class 8512-C provides overload protection and dynamic braking. Class 8512-F, for adjustable-speed motors, provides overload protection, dynamic braking and full field starting. Bobbin-type resistors mounted on the rear of the units provide the necessary resistance between points of acceleration. Inverse-time-limit overload protection is by the overload relay, arranged for either hand or automatic reset. Either low-voltage protection or low-voltage release may be obtained, depending on the type of master switch used.

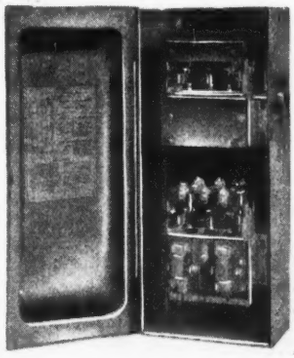


Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. Dec. 2, page 909.

Starter With Motor Circuit Switch

Standard across-the-line alternating-current motor starters may now be had equipped with a hand-operated motor circuit switch. For further security, both the starter and motor circuit switch will open the same overload. Both are housed together in a sturdy safety case. The starters are furnished with or without fuse clips and meter test jacks. Capacities are up to 20 hp., 550 volts; 10 hp., 220 volts; and 5 hp., 110 volts.

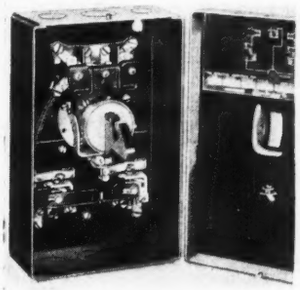
Condit Electrical Manufacturing Corporation, Boston, Mass. Feb. 11, page 228.

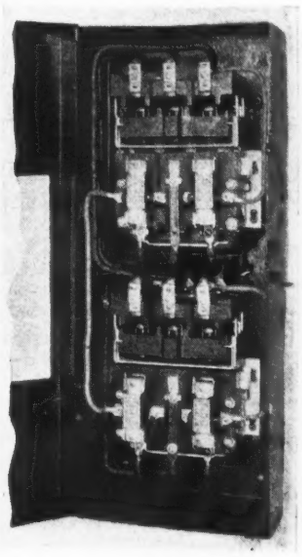


Hand-Operated A.-C. Starter

This hand-operated alternating-current starting switch with overload breakers handles all motors up to 3 hp., 110 volts, 5 hp., 220 volts, 7½ hp., 440-550 volts. Overload breakers operating on the soldered-ratchet principle eliminate maintenance of thermal plugs and fuses. The starting lever has a safety interlock which prevents the cover from being removed unless the lever is in "off" position. It can be also locked in open position if required.

Allen-Bradley Company, 1311 South First St., Milwaukee, Wis. Jan. 6, 1931, page 45.

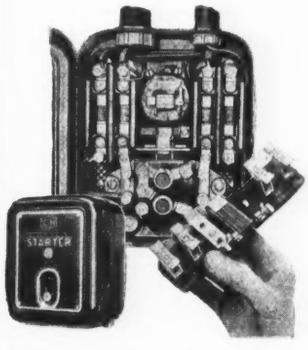




Reversing Across-the-Line Starter

Known as type A30R, this reversing across-the-line motor starter consists of two of the type A30 arc-preventing motor starters mounted in a single inclosing case and mechanically interlocked. Both starters are equipped with thermal relays for time-lag overload protection. They are for push-button control up to 20 hp., 550 and 440 volts; 15 hp., 220 volts and 7½ hp., 110 volts.

Condit Electrical Manufacturing Corporation, Boston, Mass. Dec. 30, page 1063.



Motor Starter With Twin-Break Contactor

The twin-break principle employed in this starter reduces the arc voltage by half; and arc pockets, by reducing the air content around the contacts, prevent the formation of a destructive arc. The contacts are of heavy coin-silver. A magnetic latch has been added to prevent accidental closure of the contacts if the starter is accidently bumped or tilted. A new hinge structure facilitates removing and replacing the contact board and insures correct replacing of the board before the starter can

operate. The contactors are made in three- and four-pole types. The maximum rating for two- or three-phase current are: 3 hp., 110 volts; 5 hp., 220 volts and 7½ hp., 440 or 550 volts.

Cutler-Hammer, Inc., Milwaukee, Wis. Oct. 14, page 625.

Full-Voltage Magnetic Starter

Bell cranks, toggle mechanisms and lever systems between the magnet armature and movable contact arm have been eliminated in this 2,300-volt, full-voltage magnetic starter. Complete with overload relays and a self-contained potential transformer, it is intended for across-the-line starting of squirrel-cage and synchronous motors and may also be used to control the primary circuit of slip-ring motors. Contacts used on the new starter are different from previous 2,300-volt designs. They

open and close the circuit with a wiping and rolling action and are duplicate and easily renewable. The starters are available in two sizes, with maximum ratings of 600 and 1,200 amp. respectively.

Electric Controller & Manufacturing Company, Cleveland, Ohio. Aug. 19, page 302.

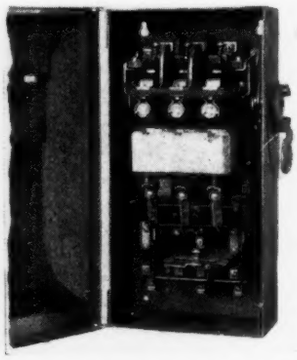
Automatic Controller for A.-C. Motors

Automatic control for two-speed, consequent-pole, squirrel-cage motors is supplied by Bulletin 9739 controller, which functions to start the motor and to change its speed by reconnecting the motor windings. It provides thermal overload protection and low-voltage protection at both motor speeds. A separate push-button master switch with "stop," "low" and "high" buttons provides three-wire remote control. They are furnished for constant horsepower, constant-torque or variable-torque motors.

Cutler-Hammer, Inc., Milwaukee, Wis. Dec. 2, page 909.

Combination Linestarter and Safety Switch

Provision is made in the design of this combination line-



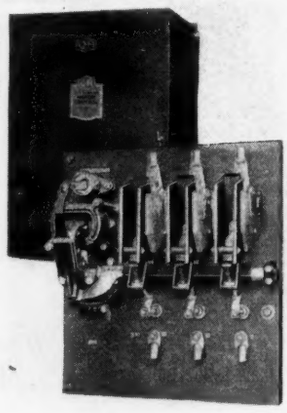
starter and safety switch, Class 11-200-HD, for inserting, while the motor is in operation and while the door of the cabinet is closed, a plug-type meter test jack to determine the load on the machine. It can be used with or without fuses, jumpers being supplied when fuses are not used. It has quick-break contacts, and the handle is interlocked with the cover, preventing opening of the door when the contacts are closed.

Westinghouse Electric & Manufacturing Company. April 8, page 566.

Starting Switch for Small Motors

Double-break silver contacts and a quick-break contact mechanism are used in this two-pole, push-button-operated starting switch for small direct-current and polyphase alternating-current motors. When tripped by an overload, simply pushing the "reset" button resets the relay and starts the motor.

Cutler-Hammer, Inc., Milwaukee, Wis. Aug. 5, page 230.



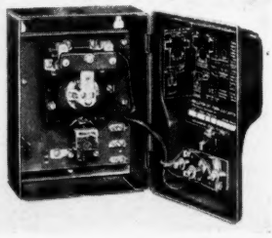
Heavy-Duty A.C. Contactors

Rated for maximum capacities of 300 and 600 amp., respectively, two magnetic contactors for heavy-duty alternating-current service are arranged for either two- or three-wire control, have continuous-duty operating coils and exceptionally heavy, butt-type, solid copper contacts. An air cushion absorbs the shock of the magnet on closing, thus tending to reduce wear and make the contactor operate more quietly.

Cutler-Hammer, Inc., Milwaukee, Wis. July 8, page 73.

Starting Switch for Single-Phase Motors

For motors operating compressors, pumps, oil burners and



similar motor-driven equipment governed by either two- or three-wire control, a single-phase starting switch (Bulletin 707) has been developed.

It is a double-pole magnetic unit with thermal overload relays and with maximum rating of 1½ hp., 110 volts, and 3 hp., 220 volts. The operating coil has a double winding for series-parallel connections, permitting the switch to be used interchangeably up to and including 1½ hp. for 110- or 220-volt motors by simply changing the terminal connections of the operating coil. It can be furnished with start and stop push buttons in the cover, without push buttons, and with two-way lever switch.

Allen-Bradley Company, 286 Greenfield Ave., Milwaukee, Wis. March 25, page 489.

Manual Starter With Push-Button Reset

In the Class 2510 manual starter all poles are simultaneously opened with the tripping of either of the two relays. The starter has a trip-free handle, which prevents blocking of the switch closed against an overload. A number of starters may be mounted in pairs or groups on pedestal or wall without waste space.

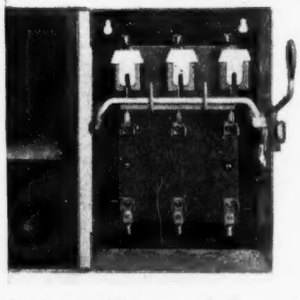
The three phase ratings are 5 hp., 220 volts, and 7½ hp., 440 and 550 volts. It is suitable for pumps, portable conveyors, fans

and any application where low-voltage protection is not required.

Industrial Controller Division, Square D Company, Milwaukee, Wis. Jan. 13, 1931, page 82.

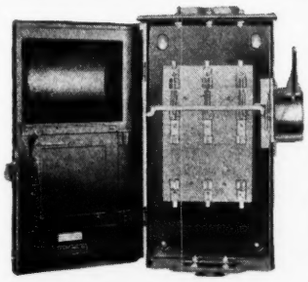
Safety Switch With Arc Quenchers

Type WK-97 quick-make and quick-break safety switches incorporate "De-ion" arc quenchers on the 575-volt sizes. The quenchers consist of nickel-plated, slotted steel plates held in place by insulating holders and mounted individually over each jaw. All copper parts of the switch are removable from



the base. The use of diamond-pointed break jaws and extended blades assures clean contacts and prevents burning.

Westinghouse Electric & Manufacturing Company. Sept. 9, page 436.



Weatherproof Safety Switch

Among the improvements made to the standard type WK-55 outdoor safety switch as represented by this new model are a drip cover of special cadmium-plated steel which permits water to drip clear of the switch; cast-iron cadmium-plated fittings, which, together with gaskets, are bolted to the drip cover and box, insuring water-tight joints for conduit. The base of ebony asbestos; has a high dielectric strength; and is non-moisture absorbing.

Westinghouse Electric & Manufacturing Company. Aug. 19, page 304.

Three-Position Pilot Switch

Motor-driven pumps, compressors and similar machines controlled by an automatic pilot device, such as a float switch,

can be manually started and stopped by this three-position switch.

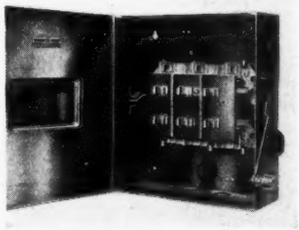
The operating lever can be placed in either the "automatic," "off" or "manual" position. When turned to "automatic" the automatic pilot device is in circuit and normal automatic operation is obtained. With the lever in the "off" position the pilot circuit is opened and the motor cannot be started from any other control point. Turning the lever to the "manual" position closes the control circuit directly and the motor will run continuously.

Cutler-Hammer, Inc., Milwaukee, Wis. Nov. 4, page 739.

Switch Eliminates Destructive Arcing

"Noark Quadbreak" switches are especially designed to eliminate destructive arcing. In this switch two contacts incorporated in an insulating slide are made to move endwise between two sets of clips. When the switch is thrown off the contacts are withdrawn from between the clips and the insulating slide moves between, thereby acting as a constant barrier.

An auxiliary cover in the main switch cover provides access to the fuses without neces-



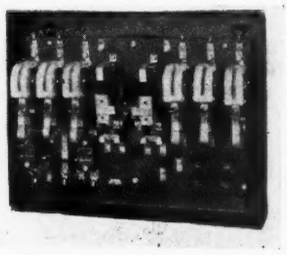
sity of opening the main cover or front of the cabinet. The auxiliary cover has a sliding interlock, making it impossible to get at the fuses unless the switch is off or to throw the switch on when the fuse cover is open.

Colt's Patent Fire Arms Manufacturing Company, Electrical Division, Hartford, Conn. April 1, page 528.

Magnetic Reversing Switch for Motors

Designed to throw small alternating-current motors directly across the line, this inclosed magnetic reversing switch consists of two triple-pole, mechanically interlocked, magnetically operated contactors, with restricted-type blowouts and with a normally open interlock on each contactor. It also has two hand-reset temperature-overhead relays. The contactors are mounted side by side on a molded base.

General Electric Company. Oct. 14, page 624.



Overload Switch for Small Motors

A free-tripping thermal overload switch for small motors is illustrated. It has push-button

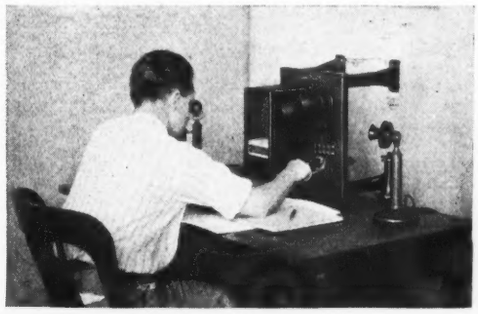
start and stop and a time-limit type of thermal overload. It is reset by pressing the start button, which also restarts the motor.

Cutler-Hammer, Inc., Milwaukee, Wis. March 11, page 409.

Audio-Frequency Control System

Automatic hydro-electric generating plants in central station systems, automatic pumping stations, etc., may be controlled from a remote point by the use of the audible-selector type supervisory equipment which utilizes audio-frequency impulses.

The supervising equipment, located in the dispatcher's office, consists of a calling dial similar to that used on dial telephones, a reset key, a howler and an

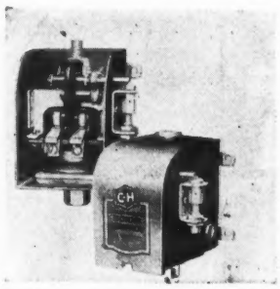


audio-frequency transmitter. The supervisory equipment, located in the outlying station to be controlled, consists of selector switches, auxiliary relays, etc., necessary to adapt the supervisory system to the control circuits of the devices supervised. To operate a unit in an outlying station the operator dials the proper code to select that unit. A series of audio-frequency impulses are transmitted over the line wires to the selector switches in the outlying station. When the signal has been made to start or stop a unit the dispatcher receives a signal via the howler to indicate that the desired operation has taken place.

General Electric Company. Dec. 2, page 907.

Small Pressure Regulator

Bulletin 10,006 regulator can be used as a starting switch for motors up to 1 hp., 230 volts, alternating or direct current, or as a pilot switch in the control circuit of automatic starters for large motors. It can be adjusted to operate at any pressure from 3 to 200 lb. and can be used for maintaining pressure on systems containing water, air, gas and other similar fluids. For air compressor service a small unloader device at the side of the case removes back pressure. Double-break silver

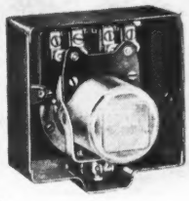


contacts prevent pitting. A rubber diaphragm is used.

Cutler-Hammer, Inc., Milwaukee, Wis. May 13, page 760.

Automatic Pressure Starting Switch

Built for starting and stopping compressor and pump motors, this automatic pressure switch is exceptionally compact and occupies an unusually small space. The size B switch is made in four forms in various combinations with or without overload breakers, disconnect switches and fuse clips. It is rated at 1 hp., 110-220 volts, for direct current; and 1 hp., 110 volts, and 2 hp., 220 volts, for alter-

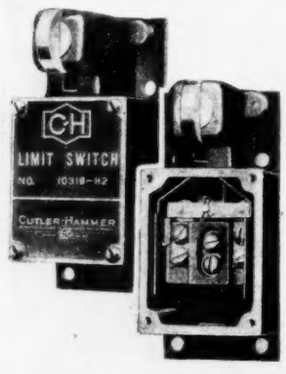


nating current. Size C is rated up to 5 hp. For larger ratings the size B pressure switch is used as a pilot control for magnetic starters of any rating.

Allen-Bradley Company, 286 Greenfield Ave., Milwaukee, Wis. April 15, page 608.

Small Limit Switch

A single-pole limit switch for general service and suitable for use on elevators, conveyors and other equipment to start, stop



or reverse the motor at its limits of travel is illustrated.

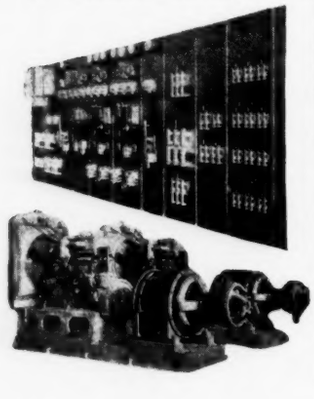
Two types are furnished: one with normally closed contacts, which are opened when the operating roller is depressed, and the other with normally open contacts, which are closed when the roller is depressed. Double-break contacts with silver-rivet contact tips reduce pitting and insure long life.

Cutler-Hammer, Inc., Milwaukee, Wis. June 10, page 920.

Switching Equipment for Stand-By Service

This automatic switching equipment, for use when alternating-current generators are direct connected to gasoline engines used as an emergency power source, is mounted on standard-sized panels and may form part of a switchboard which also takes care of power distribution.

An automotive starting unit is



provided for the engine and is energized from a storage battery which is kept charged by a rectifier connected to the alternating-current source. When indication is given of failure of the normal power supply the engine starts automatically and the generator supplies emergency power.

The control is so arranged that in case of failure of the first set to respond to the starting indication within a given time the second unit will start automatically. If this occurs the first set is locked out and requires manual resetting of a relay before it again functions.

General Electric Company. April 8, page 564.

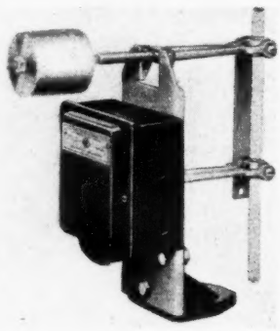
Starters and Speed Regulators for Wound-Rotor Motors

Where it is desired to have complete control of the primary and secondary of a wound-rotor

induction motor in a single unit, class 12-600 control panel is especially suitable. It is used with motors driving pumps, fans, cement mills and similar applications where the infrequency of operation makes manual control desirable.

The motor is started by closing the primary oil circuit breaker with all the resistance in the secondary circuit. The secondary drum is then gradually rotated through its successive contact positions, allowing the motor to accelerate. The motor is stopped by returning the drum to the "off" position, by tripping the primary breaker or by the use of a stop push-button station.

Westinghouse Electric & Manufacturing Company. Nov. 18, page 814.



Automatic Float Switch

Size B automatic float switch is made in four forms in various combinations, with or without overload breakers, disconnect switch and fuse clips. It provides two-pole switching and handles alternating-current motors up to 1½ hp., 110 volts, and 3 hp., 220, 440 and 550 volts; the direct-current rating is 1 hp., 110 or 220 volts.

Size C switch provides three-pole switching and is rated for single-phase motors up to 1½ hp., 110, and 3 hp., 220 volts; for polyphase motors up to 3 hp., 110, and 5 hp., 220, 440 and 550 volts.

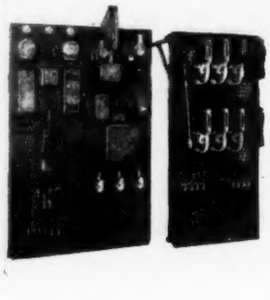
Allen-Bradley Company, 1311 South First St., Milwaukee, Wis. Dec. 23, page 1025.

Dry Rectifier for Switching Equipment

A number of improvements over older models are incorporated in this automatic switching equipment for synchronous converters in mine service. The greatest improvement is the use of a copper-oxide rectifier, which is connected to the alternating-current power supply, thereby providing a definite source of power at correct polarity with which to flash the field. The field-flashing contactor and the main-field contactors are retained.

Two relays formerly used to check the polarity and voltage conditions are now combined in one, which also uses a copper-oxide rectifier in its circuit. The equipment provides protection to substation machines in the event of almost any abnormal condition.

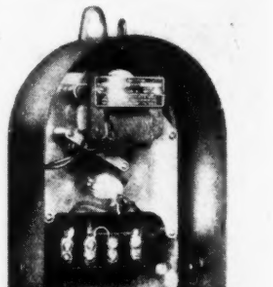
General Electric Company. Aug. 12, page 266.



Automatic Time Switches

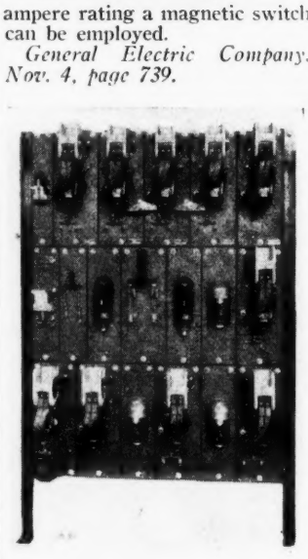
The time cycle of this automatic time switch for closing and opening electric circuits at short predetermined intervals may be a few minutes or several hours, depending upon the gearing used. In certain forms, the relative amount of time "on" during the complete time cycle can be varied.

The switches are single-pole, with one-way or two-way contacts, and are rated 5 amp. at 115 volts or 2½ amp. at 230 volts. On circuits of higher



ampere rating a magnetic switch can be employed.

General Electric Company. Nov. 4, page 739.

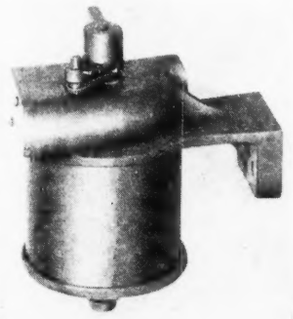


Dynamic Braking Controller for Crane Hoists

This dynamic braking controller for crane hoists has been especially designed to eliminate the usual sluggishness of the solenoid brake in the lowering direction. Instead of passing only one-third of the line current through the brake on the first point lowering, this new circuit passes all of the line current through the brake. This improvement insures faster operation, more accurate control of short, quick movements and better ability to spot loads. It

is suitable for use on crane, coal bridge and bucket hoists.

Electric Controller & Manufacturing Company, Cleveland, Ohio. Feb. 4, page 192.



Unit-Type Auxiliary Switch

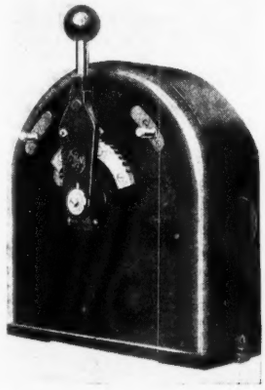
This unit-type auxiliary switch for use with oil or air-brake switches, motor-operating mechanisms and similar equipment can be made to open or close the current at any position. If it is desirable to have one unit circuit-opening instead of a current-closing, or vice-versa, a simple adjustment permits of this without taking the switch apart.

Delta-Star Electric Company, 2400 Fulton St., Chicago, Ill. July 29, page 192.

Master Switch for Magnetic Controller

To regulate the control circuits of a magnetic-contactor controller as used on cranes, hoists and other applications where full speed control from the master switch is desired is the function of this master switch.

Certain refinements incorporated in the design of the switch



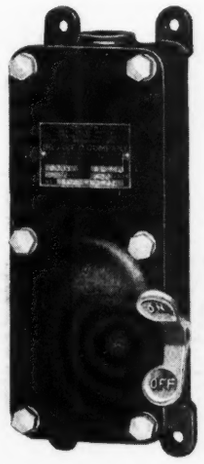
are, frictionless operation due to the use of ball bearings; short-throw operating handle; absence of gears, contact fingers riding on uninterrupted plane surface; and an accurately machined, notched track on which an improved roller-type centering device rides.

Switches for 4, 5 or 6 points of speed control are identical, the only difference being the location of the arm stops. These stops can readily be changed in the field to provide any one of these number of points of speed control.

Electric Controller & Manufacturing Company, 2700 East 79th St., Cleveland, Ohio. May 20, page 799.

Explosion-Proof Control Station

Type BR10 explosion-proof control station has a housing sufficiently strong to withstand internal explosions without transmitting the flame to the surrounding gaseous atmosphere. The inclosure is provided with two compartments, one of which



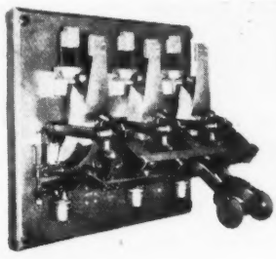
is used for the contact mechanism and the other as a connection box. The contact mechanism consists of one normally open and one normally closed contact.

Industrial Controller Division of the Square D Company, Milwaukee, Wis. Nov. 18, page 814.

Improved Circuit Breakers

Type CK-8 trip-free breaker is designed for heavy-duty service ranging from 1,600 to 3,000 amp. The line also includes the type CN-1 breaker, applicable to industrial service and to circuits in buildings where the current is from 3 to 300 amp., and type CO-108, suitable for moderate-duty service, rated 1,200 amperes.

Advantages claimed for these breakers are that they are trip-free from the handle on overcurrent; there is triple contact; no burning on the main brush; burning tips are easily replaced; high-pressure main contact is



formed of laminations which make "end-on" contact with heavy and uniform pressure and yet is closed easily.

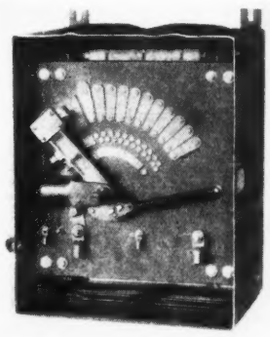
General Electric Company April 29, page 687.

D.-C. Speed-Regulating Rheostats

Comprising this line of direct-current speed-regulating rheostats used for starting and regulating the speed of shunt- or compound-wound, direct-current motors in non-reversing service are three classes designated by numbers. Class 7350 is used where a 50 per cent speed reduction through armature control and 25 per cent increase by field control are desirable. Class 7310 is employed where a 50 per cent speed reduction through armature control only is desirable, and Class 7210 where an increase in speed up to four times full speed through field control is required.

In Class 7210 the field contact arm is so interlocked with the armature contact arm that the field resistance can be cut in for speed regulation only when the armature contact is in the "run" position.

Westinghouse Electric & Manufacturing Company. Sept. 2, page 402.

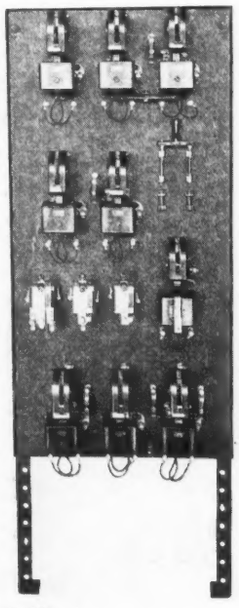


Crane and Hoist Control

Two types of control, one, designated CR-4426, for use on the bridge and trolley motions of cranes, and the other, designated CR-4422, for application on hoist motions, are included in this redesigned line. Each type is available in two forms, one with and one without overload protection. On both, the circuit breaker contactor, which formerly opened only on overload, has been replaced by a line contactor.

A new type of three-point, cam-operated master switch is used, and new overload relays are incorporated which allow a greater calibration range and require but one coil instead of two or three for a given contactor size.

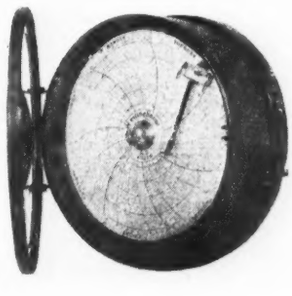
General Electric Company. March 25, page 490.



Instruments for Switchboard and Portable Use

These instruments are designed principally for alternating-current applications, but are also applicable to certain direct-current services. The ammeters are available in sizes ranging from 5 to 50 amp., and give a full-scale reading from zero to the value at which the meter is rated; the voltmeters are made in ratings varying from that which gives a scale of from 90 to 140 volts to that which records a maximum voltage of 550.

Three kinds of clocks for moving the circular chart are provided: a key-wound, eight-day clock for driving the one-

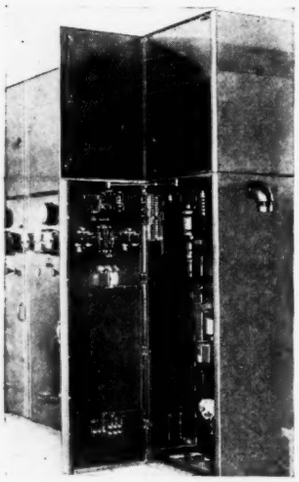


week charts; a key-wound, 36-hr. clock for driving the one-day charts; and a sub-synchronous motor-driven clock.

Westinghouse Electric & Manufacturing Company. Jan. 13, 1931, page 83.

Indoor Cubicle

The units included in this indoor cubicle-type switching equipment, consisting of oil breakers and vertical swinging panels, with disconnecting switch compartments, are for either manual-, alternating-current- or direct-current-solenoid-operated oil circuit breakers, and may be equipped with



automatic reclosing equipment, if electrically operated.

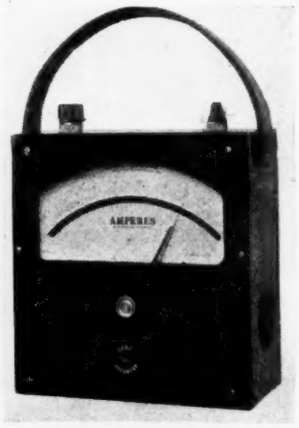
The cubicles are constructed of structural-steel members and ⅜-in.-thick steel shapes securely welded together. In the lower section of the cubicles a vertical steel barrier separates the high-tension equipment from the breaker mechanism and secondary control wiring. The oil circuit breaker compartment is closed by a hinged steel door which permits of inspection of the equipment and removal of the breaker tanks.

Westinghouse Electric & Manufacturing Company. July 22, page 152.

Motor-Starting Ammeter

Measurement of the instantaneous starting current of alternating-current and direct-current motors is possible with this ammeter. The instrument has a double range, and changeover from one range to the other is accomplished by turning a switch on the side of the case.

Such measurements as starting current, locked-rotor current and running current can be made without disconnecting the instrument from the line. The instrument is connected in the circuit like any other ammeter,



but the reading is taken by "set-and-try." When the final adjustment is reached the needle will quiver just a little when the current is turned on, indicating that the maximum starting current is being measured.

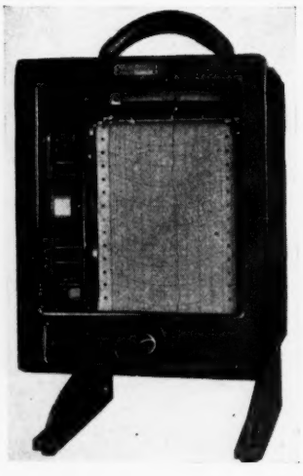
Westinghouse Electric & Manufacturing Company. June 17, page 963.

A.-C. and D.-C. Graphic Instruments

Types AG and DG graphic instruments for alternating and direct current have the clock, chart and electrical mechanisms mounted on a common sub-base hinged on one side of the main base. This sub-base can be unlatched and swung outward, making it readily possible to inspect the operating mechanism.

The direct-current ammeter and voltmeter mechanisms are of the high-torque d'Arsonval type, and the alternating-current movements are of the dynamometer type. All instruments are furnished with gears for five speeds, namely, ¾, 1½, 3, 6 and 12 in. per hour. They have a strip type of chart, 5 in. wide, with 4½-in. scale, and are available in switchboard, wall and portable designs.

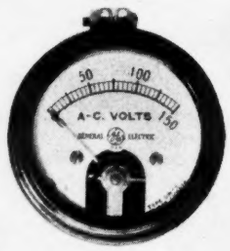
Roller-Smith Company, 233 Broadway, New York City. May 6, page 724.

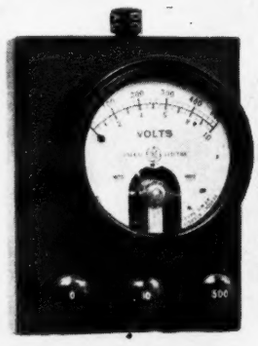


Small Instruments for Testing

These small voltmeters and milliammeters are put out in 2¼- and 3-in. cases, for use on both alternating- and direct-current lines. They have molded compound cases and bases and are equipped with full-wave copper-oxide rectifiers mounted within the case. The voltmeters are put out in ratings from 2 to 150 volts, and the milliammeters in ratings from 0.5 to 15.

A portable voltmeter with a





double-range 10/500-volt scale and a knob for adjusting to read either alternating or direct current is also available.

General Electric Company. March 18, page 449.

Meter and Relay Test Switch

The checking of meters and relays is facilitated by the use of this test switch. It has a one-piece Bakelite case, in which is mounted a rotor on a square steel shaft. Phosphor-bronze contact jaws on both sides of

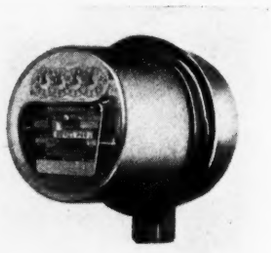
the case and specially designed knife blade assemblies complete the mechanism.

The switches are made in four-, six-, eight- and ten-pole combinations for switchboard mounting. An interlocking feature provided by the faceplate prevents the key from being withdrawn after test until the switch is restored to service position. Space occupied on the switchboard is 4x4 in. for each switch.

Meter Devices Company, 3115 Tuscarawas St., Canton, Ohio. July 1, page 36.

Detachable Watt-Hour Meter

A detachable watt-hour meter that can be plugged into place



or removed readily through the use of plug terminals is illustrated. The meter is housed in a weather-proof case, making it suitable for use either indoors or outdoors.

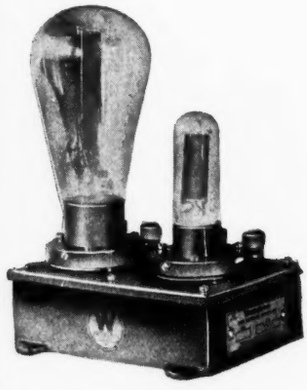
Westinghouse Electric & Manufacturing Company. Feb. 11, page 228.

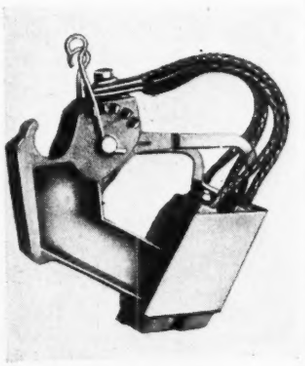
Photo-Electric Cell and Amplifier Unit

Automatic smoke detection, recording of smoke density, lighting control for turning on and off artificial lights according to the intensity of the natural light, and ringing alarms are some of the uses to which the photo-electric cell can be put.

The top, a Micarta panel, is provided with two four-prong bases for mounting the photo-electric cell and the amplifier tube. All of the wiring is concealed.

Westinghouse Electric & Manufacturing Company. April 15, page 607.





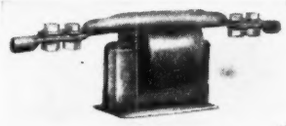
Double Brushholder to Prevent Sparking

By the use of two individual brushes in a double brushholder the possibility of sparking on large currents, is materially lessened. This design is said to insure constant contact and to eliminate the voltage drop between brush and commutator. The holder is of die-cast construction.

Westinghouse Electric & Manufacturing Company. Oct. 14, page 625.

Current Transformer for Instruments and Relays

Built in ratings from 5 to 800 amp. and designed for 5,000-volt operation, this current transformer embodies compen-

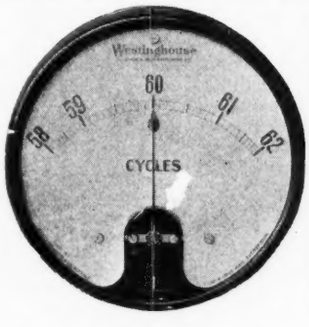


sating features which practically eliminate ratio- and phase-angle errors. Designated WF-1, it supersedes the WC-12 model, with which it is interchangeable as to dimensions. It is arranged for either flat-surface or pipe mounting.

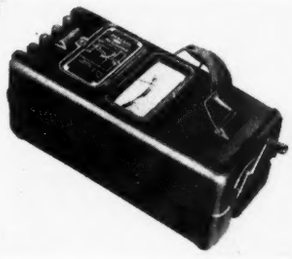
General Electric Company. Oct. 7, page 590.

Indicating Frequency Meter

Ranges obtainable in Type S4 indicating frequency meter are from 54 to 66 cycles, and from 58 to 62 cycles for use on 60-cycle systems. The instrument illustrated has a scale range of plus or minus 2 cycles and differs from the usual resonance type of ratio instruments in that a single resonant circuit of the parallel type is employed. The circuit design is such that the change of resistance of the reactors and coils due to temperature variations produces no effect.



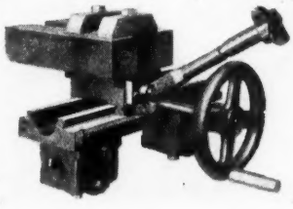
Westinghouse Electric & Manufacturing Company. April 22, page 648.



Megohmer for Resistance Measurements

In the Paragon Megohmer, the measuring system is of the differential type, with one series, one shunt and one compensating coil. A self-contained generator unit driven through fiber gears from a small crank furnishes the current for the instrument. An improved centrifugal-type clutch assures constant voltage at speeds in excess of 120 r.p.m. of the crank handle. A recess in the case protects the binding posts, of the spring-locking type, from breakage.

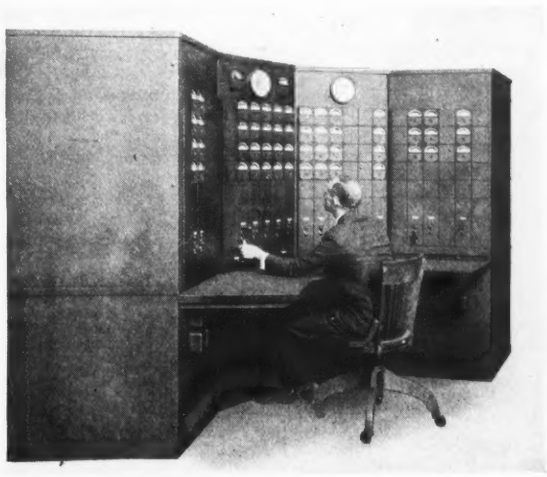
Herman H. Sticht & Company, 15 Park Row, New York City. April 15, page 607.



Improved Commutator Grinder

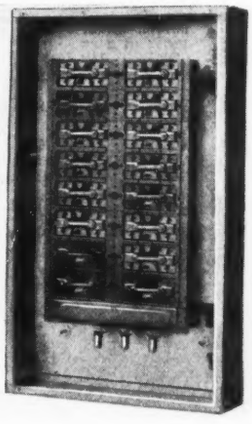
In order that it may be used within a space the same length as the base, this grinder has no protruding parts on the side. The cross-feed wheel is in the back, making it possible to use the grinder on commutators having outboard fans or other obstructions.

Ideal Commutator Dresser Company, Sycamore, Ill. April 29, page 686.



Dead-Front Safety Type Panelboard

The line of Bull Dog panelboards has been extended by the addition of a sixteen-circuit three-wire panel. This panel is an assembly of double-branch, three-pole, 30-amp. bakelite units fitted with inside switch heads.



The cabinet is only 32 in. high, 19 in. wide and 5½ in. deep.

Bull Dog Electric Products Company, 7610 Joseph Campau Ave., Detroit, Mich. Jan. 20, 1931, page 122.

Switchboard Requires Small Space

Each individual unit of this inclosed miniature switchboard is furnished complete by the manufacturer and is made of welded fabricated parts. It occupies an angular space of 30 deg., so that a total of six units can be mounted in the half-circle, leaving the operator a space of 4½ ft. in diameter.

Instrument indication is provided in addition to the usual lamp indication of breaker position, and where desired synchroscope jacks can also be mounted on control key panels.

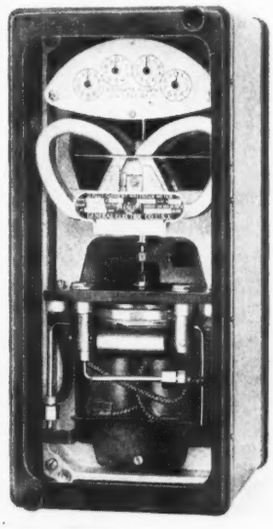
The equipment is inclosed, and the wiring may be inspected through a double door on the back of each unit. The flush-mounted instruments, in the upper section, are uniformly 4½x4 in., for both alternating current and direct current. They are furnished with anti-parallax scales and pointers. Supports on each unit provide mounting for a total of 36 instruments in addition to a synchroscope and two voltmeters.

General Electric Company. July 29, page 193.

Mercury-Type Watt-Hour Meter

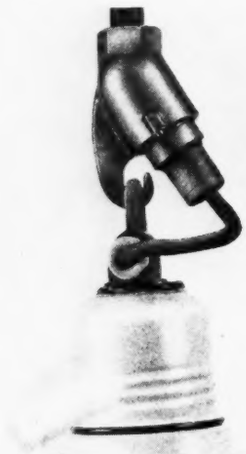
Provision has been made for periodic renewal of the mercury in type HS-11 direct-current watt-hour meter. The cup, made of metal, is built as one unit complete with rotor and mercury and is easily replaceable; this eliminates the necessity of disassembling and cleaning the mercury chamber. This meter is particularly adaptable where panel space or bus limitations are of major importance.

General Electric Company, Aug. 5, page 229.



Safechange Lamp Hanger

To permit of the easy and safe removal of industrial units for cleaning or relamping, this

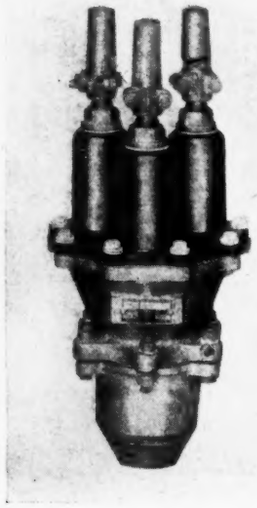


safechange lamp hanger has been developed. The upper casting is threaded at the top for attachment to the conduit, and in it is the receptacle for the plug used for connecting and disconnecting the lighting unit. The hook cannot be engaged or disengaged while the plug is in place. Therefore, a unit cannot be removed or replaced without first disconnecting it from the line.

Westinghouse Electric & Manufacturing Company. July 29, page 191.

Three-Conductor Cable Terminator

A three-conductor terminator for either compound or oil filling and designed to be vacuum-tight and to withstand a hot oil pressure of 50 lb. with oil at 180 deg. is illustrated.



The main body is of aluminum alloy, and the top element is made of high-electrical-strength molded insulation mechanically stronger than porcelain. The terminators are for voltages up to and including 7,500, and for ampere capacities up to 500.

Delta-Star Electric Company, Chicago, Ill. Jan. 6, 1931, page 45.

Solderless Terminal Lug

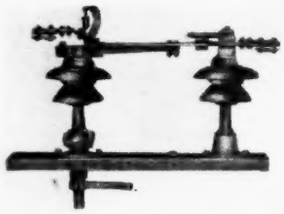
Intended for use with air-break and oil-break switches, this compression type of solderless terminal lug bolts directly to the equipment contact block or stud, and the line conductor is clamped in position by means

of U-bolts which tighten down, forming a solderless compression joint. These terminal lugs are available for a wide range of conductor fittings.

Delta-Star Electric Company, Chicago, Ill. April 15, page 607.

Gang-Operated Disconnect Switch

This improved type of pole-top gang-operated disconnect switch is fitted with a solderless



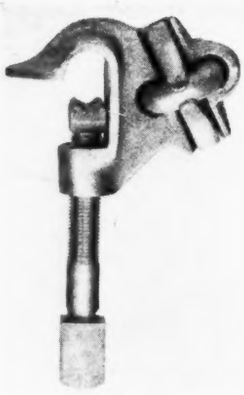
compressor-type terminal lug providing a convenient line connection. It is made in a number of ampere and voltage ratings and in both hand- and motor-operated types.

Delta-Star Electric Company, Chicago, Ill. April 1, page 529.

Mill and Hoist Motor Brushes

A line of brushes for use on mill-type and hoist motors has been developed. The line includes grades suitable for all types of mill and hoist motors, operating under varying conditions and at all voltages of alternating or direct current.

Speer Carbon Company, Saint Marys, Pa. July 29, page 192.



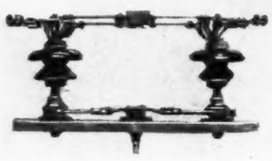
Improved Hot-Line Clamp

For making permanent connections to switches, transformers, lightning arresters, cutting-in tap lines, jumpers on transformer lines and ground clamps, and in work on aluminum and copper conductors this hot line clamp is especially suitable. For normal distribution service it can be used to tap off individual transformers without installing disconnecting switches. It is operated by a hook stick, with a snap socket securely holding it during operation.

Delta-Star Electric Company, Chicago, Ill. July 22, page 154.

Side-Opening Line Switch

In this side-opening gang-operated switch for voltages up to 132,000 with both insulators rotating, double blades are provided with full-floating contacts inclosed in a sleet-proof housing. Terminal lugs are of the



solderless type, eliminating soldering in the field. The switch illustrated is rated 37,000 volts and 600 amperes.

Delta-Star Electric Company, Chicago, Ill. April 8, page 565.

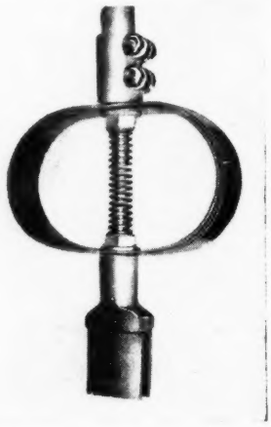
Expansion Bends for Rigid Conductors

A standardized line of expansion bends for connecting rigid conductors to transformer and oil circuit breaker studs has been made available. The bends protect the bushings against strains resulting from thermal expansion of conductors and uneven settling of the transformer and oil circuit breaker foundations with relation to the structure. They are applicable to copper bar and copper tubing.

General Electric Company. March 11, page 409.

Combination Support and Expansion Joint

To protect bushings of oil circuit breakers, transformers, etc., against thermal expansion of their conductors and misalignment due to unequal settling of structure footings, is a function



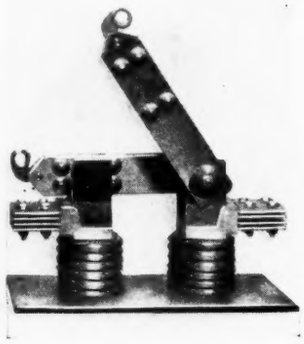
of this combination support and expansion joint. The weight is carried on a spring the stiffness of which can be regulated to the amount of load carried.

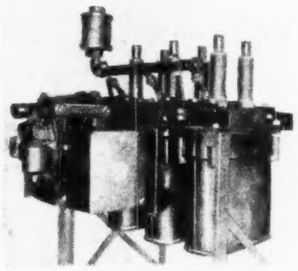
Delta-Star Electric Company, Chicago, Ill. Feb. 11, page 228.

Double-Blade Disconnecting Switch

Each set of separately operated blades in this double-blade tongue-type indoor disconnecting switch, rated at 15,000-volt, 3,000-amp., is equipped with positive safety locks. Terminals can be provided for flat or round bars, solid or stranded wire or copper tubing. The insulators are wet-process, dark brown glaze porcelain of high mechanical strength.

Delta-Star Electric Company, Chicago, Ill. March 25, page 489.





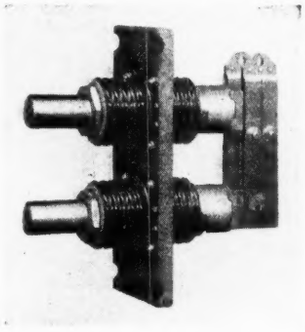
Oil Circuit Breaker for Indoor Service

These breakers are manually or electrically operated and are available with one, three or four poles, single-throw. They are designed for indoor service only and especially for use in power plants and substations where a small space is available for switching equipment. They are rated at 15,000 volts and 400 to 200 amp. Four types comprise the line.

Westinghouse Electric & Manufacturing Company. Sept. 23, page 514.

Ventilated Stud Disconnect Switches

Hollow studs with openings at both ends, giving free circu-



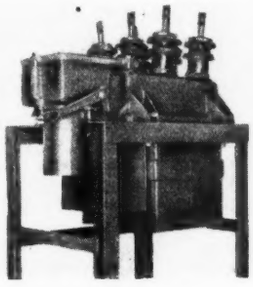
lation of air throughout the entire length are used in this high-capacity, tongue-type, back-connected disconnecting switch. There are no brazed or soldered joints, and the cast base is made of high-strength bronze.

Delta-Star Electric Company, Chicago, Ill. Aug. 19, page 304.

Outdoor Oil Circuit Breaker

Type FO-22 weatherproof oil circuit breaker is available in two- and three-pole single-throw sizes, in capacities of 400, 600 and 800 amp., for operating voltages of 7,500 or less and with an interrupting capacity of 3,500 amp. at 7,500 volts. The breaker is arranged for either manual, direct-current solenoid or alternating current solenoid (direct-current solenoid—Rectox combination) operation. The automatic breaker is mechanically trip-free at any point of the closing stroke and can be equipped with a number of tripping attachments.

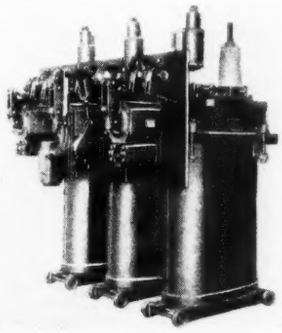
Westinghouse Electric & Manufacturing Company. May 9, page 725.



Indoor Oil Circuit Breaker

Type F-114 circuit breaker is especially suitable for the control and protection of generators and feeders in central stations.

Quick-clearing, high-speed interruption is secured by an arc-

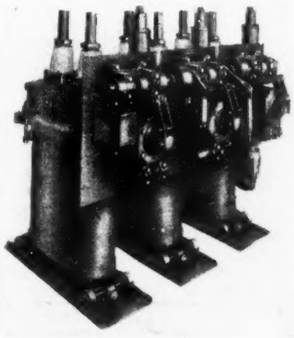


ing contact structure which combines the advantages of magnetized arc zones, thermal absorption capacity and occluded contacts.

Condit Electrical Manufacturing Corporation, Boston, Mass. March 25, page 489.

Indoor-Type Oil Circuit Breaker

Quick-clearing, high-speed interruption is secured in this oil

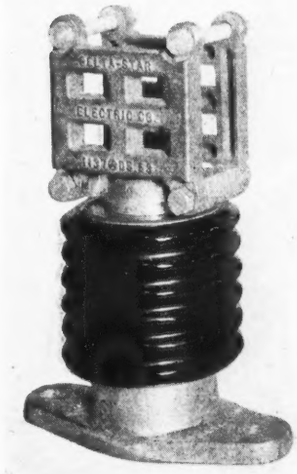


circuit breaker by an arcing contact structure which combines the advantages of magnetized arc zones, thermal absorption capacity and occluded contacts. It is of the indoor-type, designed for cell structure, truck or platen mounting, for 2,000 amp. or less at 15,000 volts. Main current-carrying contacts are inverted laminated brushes specially designed to withstand extremely high in-rush currents.

Condit Electrical Manufacturing Corporation, Boston, Mass. Feb. 4, page 192.

Heavy-Duty Bus Support

This six-inch diameter heavy-duty insulator unit has, at each end, metal inserts threaded at



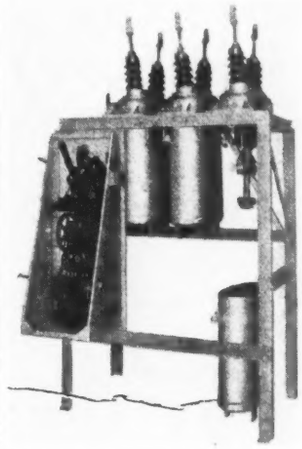
the center for bolts by which top and bottom fittings are attached. With this single-bolt construction the fittings can be turned to any position in a horizontal plane, permitting the bus to be run at any desired angle to the supporting structure.

Delta-Star Electric Company. Chicago, Ill. March 18, page 449.

Moderate-Capacity Oil Circuit Breaker

Type O-11, outdoor oil circuit breaker embodies the important features of easy closure and at the same time affords ample pressure at the contact surfaces. Inverted laminated brushes are protected on closing and opening by exceptionally large arcing contacts. Provision is made for two bushing-type current transformers per pole. Series-type current transformers mounted within the breaker tank may also be supplied.

The breaker is available for 600 and 800 amp., manually or



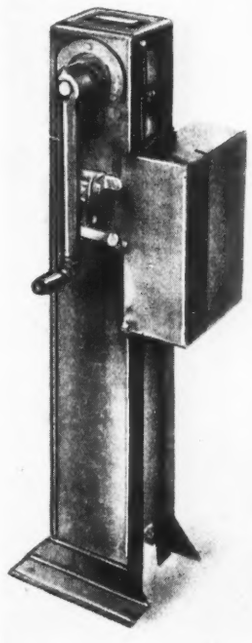
electrically operated, alternating current and direct current. The estimated interrupting capacity is 5,000 amp. at 15,000 volts.

Condit Electrical Manufacturing Corporation, Boston, Mass. July 8, page 74.

Pedestal for Gang-Operated Switches

In this pedestal for gang-operated heavy-duty disconnecting switches the vertical operating shaft at the top end has miter gears driven by a handle. The lower end has a universal joint, allowing the operating pedestal to be set over the shaft and bolted down without special aligning.

A wing extension on the shaft traveling nut acts as a positive stop in both positions. Each pedestal has inclosed contacts in series with the oil-breaker operating circuit, open-



ing this circuit unless the disconnects are in the fully open or closed position.

Champion Switch Company, Kenova, W. Va. July 15, page 114.

Switch House for Transformer Vaults

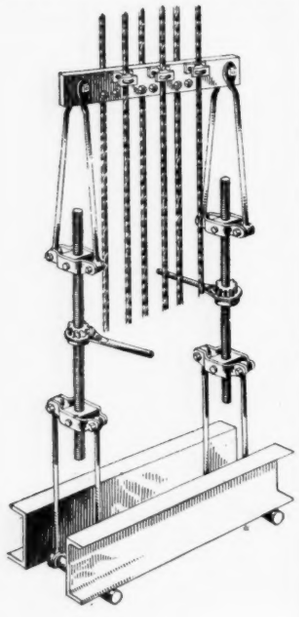
This line of switch houses for installation in customers' transformer vaults is complete with mounting devices for any one of four connection diagrams, de-

pending upon the number of feeders and type of service desired. Gang-operated disconnects at the top are operated from a handle adjacent to the oil circuit breaker control handle.

Delta-Star Electric Company, Chicago, Ill. Aug. 5, page 230.

Elevator Car-Lifting Device

To facilitate the job of renewing or shortening elevator rope the car-lifting equipment shown has been developed. Two

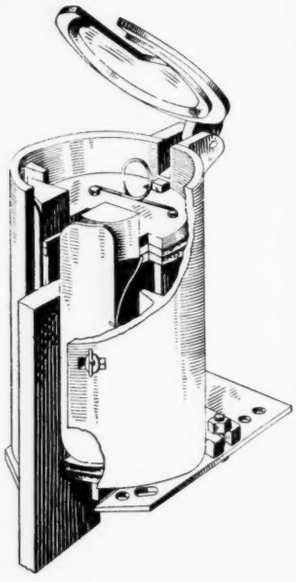


hangers connect under the car's crosshead, and at the top end of the hangers is an equalizing bar with a threaded nut in the center. The top part of the equipment has a flat beam in which are U-bolts for clamping the cables. The car is lifted by the threaded rods, which have a fixed nut at their centers, with a ratchet wrench for easy operation. When shortening the ropes the use of the device eliminates the necessity of blocking the counterweights and of using any overhead rigging.

Evans Elevator Equalizer Company, Chanin Building, New York City. July 1, page 36.

Elevator Guide-Rail Lubricator

A type of guide-rail lubricator designed especially for use on high-speed elevators is illustrated. It is provided with an adjustable mounting to allow easy attachment to any guide



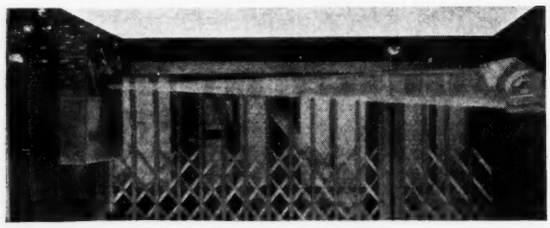
shoe. The front of the reservoir is sealed to the guide rail by two spring-actuated fiber shutters, and the mounting plate has holes so located as to allow mounting on any type of car or counterweight guide shoe.

Grease is packed in the reservoir around the guide rails and is applied to them by the movement of the car and counterweight. Each lubricator holds about 2 lb. of grease, sufficient for about one year.

Yvan Zenon, 244-22 136th Ave., Rosedale, N. Y. March 4, page 373.

Equipment for Directing Elevator Passengers

Consisting, essentially, of a screen installed on one side of the car, and on the opposite side



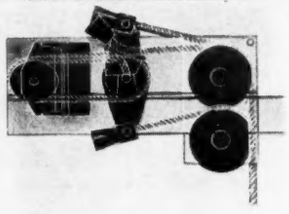
a projector with its operating mechanism, the Rotoscope is designed to automatically give passengers information as to floor number, name of company or department. The equipment may be located anywhere that will bring the screen in plain view of the passengers and the operator.

In the projector there is a film carrier that has a number of positions equal to the number of floors in the building. Each position is used to carry a section of film with a message on it. When the car leaves a floor the announcement for the next floor is moved into position automatically in the projector and flashed on the screen, this permitting the passengers to read the message and be prepared to leave at the floor desired. When the car is reversed in its travel, the Rotoscope also reverses and flashes the correct indication on the screen.

Elevator Supplies Company, Inc., Hoboken, N. J. Aug. 12, page 265.

Equalizer for Elevator Compensating Ropes

Instead of hanging vertically as did the earlier type, this improved automatic equalizer for compensating ropes is installed horizontally. The type shown is for five compensating ropes.



The ropes come from the compensating sheave up over five sheaves on the equalizer. Three ropes come on top and two below, each on its own sheave to allow for free movement.

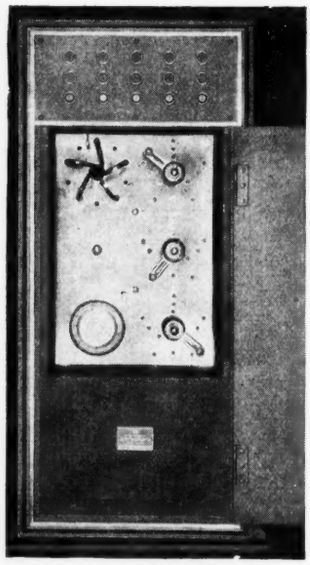
Four of the ropes connect to the ends of two equalizing bars, and the fifth rope is attached to one end of the equalizing cable. From this connection the equalizing rope passes over a stationary sheave in the equalizer, then over a sheave on one of the equalizing bars, around another stationary sheave and over the sheave on the other equalizing bar and back to the rear of the equalizer.

When six compensating ropes are used the equalizer is arranged with three equalizing bars, each group of two ropes connecting to the ends of a bar.

Evans Elevator Equalizer Company, Chanin Building, New York City. Dec. 30, page 1061.

Automatic Dispatcher for Elevators

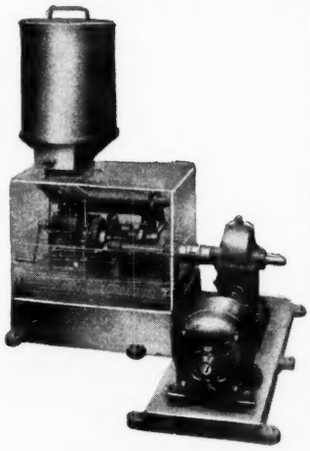
This system consists of a dispatching machine, installed in or near the main elevator corridor, and three lights on each car. Three arms, one for each light



in a car, shown on the right in the figure, are motor-driven and rotate at a constant speed. In the path of each arm is a contact for each car to be dispatched. If there are five cars, each arm has five contacts. In each car there are three lights, one red, one white and one green. As the arms on the dispatching machine rotate over the different contacts they flash the lights in the cars. When it is time for a car to leave the bottom terminal landing a green light flashes in front of the operator; the red light flashes when it is time for the car to leave the top landing; and the white light flashes when the car should be half way down the hoistway.

Elevator Supplies Company, Inc., Hoboken, N. J. June 24, page 986.

Oil Lubricating Systems, Filters and Purifiers



Mill-Type Grease Pump

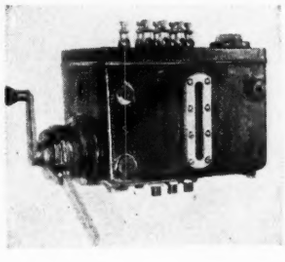
Built in sizes of 4, 6, 8, 10 and 12 feeds per unit, this mill-type grease pump is designed to deliver grease under any bearing pressure up to a maximum of 5,000 lb. Special sizes are made up to 24 feeds per unit.

A distributor head with the requisite number of leads is directly connected to the discharge side of the pump. Delivery lines are attached directly to the distributor head and lead to the bearings. All running parts other than the motor and gear-reduction unit are inclosed, the entire mechanism operating in a grease or oil bath. Where more than 24 feeds are needed, two or more units may be connected with a common driving mechanism.

Hills - McCanna Company, 2349 Nelson St., Chicago, Ill. May 13, page 759.

Mechanical Lubricators in Five Types

Ease and accuracy of regulating the quantity of lubricant delivered; positive operation, simple mechanical construction, eliminating all valves; uniform lubricant delivery at slow speeds; and wide range of pressures are features of this line of mechanical lubricators, which includes five different types.



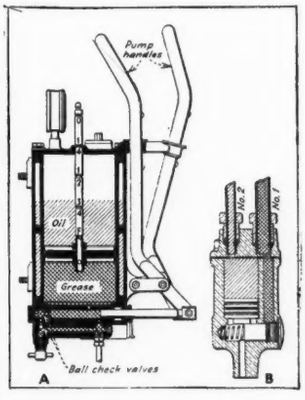
Type D has a positive piston mechanism and is arranged for from 1 to 38 feeds. It is equipped with an oil reservoir and either ratchet or rotary drive for right-hand or left-hand rotation, or both. It will work against pressures from 500 to 2,800 lb. Model DS1 is distinguished from type D by the sight feed provided for observing the oil feed in the form of drops.

Smaller lubricators are available in types P, PK and PS. Type P has from one to eleven feeds, but is not supplied with an oil reservoir.

Nathan Manufacturing Company, 250 Park Ave., New York City. Aug. 12, page 265.

Heavy-Duty Centralized Lubrication System

The "Dualine" system of lubrication consists of one central compressor and two main supply lines connected in series to a positive - piston - displacement type of measuring valve at each bearing. The central station consists of a double-compartment reservoir serving two individual plunger-type guns. One gun delivers the bearing grease to all valves connected to the one line and the other gun provides the necessary oil pressure to discharge all valves. This oil pressure serves to operate a plunger in each valve and to insure the grease's being forced into each bearing at high pressure.

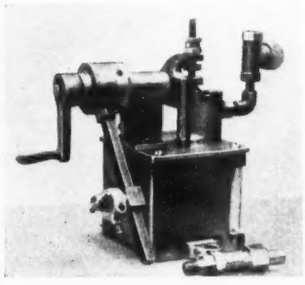


An automatic system is available in which the two central stations are electrically driven, with the frequency of operation controlled by an electric time clock. Any desired interval from two minutes to two hours can be had.

Lubrication Devices, Inc., Battle Creek, Mich. No. 11, page 774.

Driving Mechanism for Oil Lubricators

The principle of the Kam-Klutch, developed for lubricator drive, is spring-held rollers embodied in a housing that work with and against the crankshaft when operating. The drive permits attachment to high-speed driving arms in any position within the arc of a complete



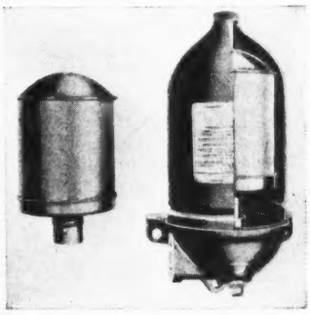
circle, and likewise gives the lubricator greater speed in oil delivery. This drive is interchangeable with the present ratchet drives.

Hills - McCanna Company, 2349 Nelson St., Chicago, Ill. Jan. 20, 1931, page 122.

Oil Filter With Metal Filtering Element

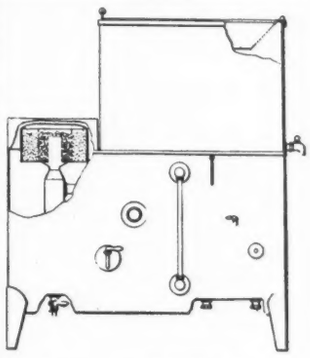
The filtering medium of the "Purolator" is a wedge-shaped metal ribbon on one of the flat surfaces of which are raised spots 0.003 in. high forming uniform spacers at regular intervals.

Elements for the B-type unit



are made in two sizes, the B-15M and the B-1M. The former is 3⅛ in. in diameter and 4⅛ in. long, with 4,150 lineal inches of filtering slot 0.003 in. wide. The latter is 4⅛ in. in diameter and 4¼ in. long, with 5,550 lineal inches of filter slot.

Motor Improvements, Inc., 365 Frelinghuysen Ave., Newark, N. J. April 15, page 606.



Improved Oil Filter

Applicable to purifying any kind of oil, this fuel-oil filter embodies the use of four distinct settling chambers, and the ultimate purification is through perforated screens, filter cloths, bone black and white waste. In passing through the filter the oil does not come in contact with the filtering medium until practically 75 per cent of the impurities have been removed.

Provision is made in the design for the installation, when desired, of steam, hot water or electric heating elements.

Burt Manufacturing Company, Akron, Ohio. June 3, page 885.

Automatic Bypass-Pressure Oil Filter

This filter will withstand a working pressure of 100 lb., is not affected by vibration, and may be set horizontally, vertically or at an angle anywhere in the discharge line between the pump and the bearings.

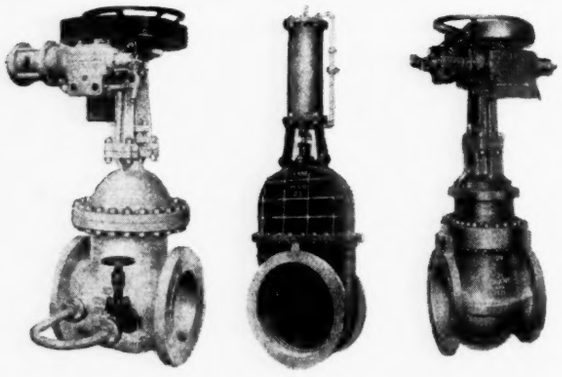
The filtering equipment consists of four filtering bags of different grades and density of fabric to suit the viscosity of the oil, which are fastened to four projecting oil nozzles on a central distributing spool through which the oil is forced into the bags. A hinged-wire cage container keeps the bags in place.

The filters are made in three different sizes, for pressure drops of 3, 10 and 15 lb., and capacities ranging from 87 to 4,637 gal. per hour.

William W. Nugent & Company, 410 North Hermitage Ave., Chicago, Ill. March 4, page 372.

Piping, Valves and Fittings

Electric-, air-motor and cylinder-operated valves; expansion joints with metallic-diaphragm flexing elements, and an improved line of threading, reaming and cutting-off tools



Electric, Air-Motor and Cylinder-Operated Valves

A type C motor control, type C air-motor control, and a cylinder-operated unit are included in this line of power-valve-operating equipment. In the type C unit the entire motor unit and control are mounted on a pad on the valve yoke that can be swung around the yoke to any position without disturbing the rest of the valve. A lost-motion feature is also incorporated in the drive, which furnishes a hammer blow to unseat the disk of the valve and permit the motor to attain full speed before it encounters the disk load. A combined mechanical limit switch and torque cut-out are employed, the torque cut-out operating in the closing of the valve only.

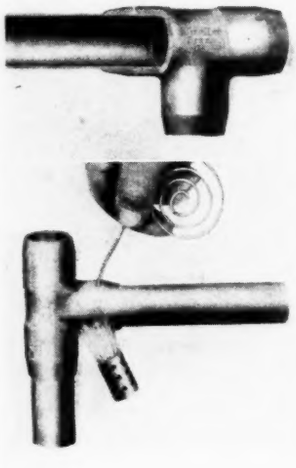
Speed and simplicity characterize the cylinder-operating unit, which consists of a cylinder mounted on the valve yoke and a four-way cock to control the operating fluid. When used on low-pressure medium and standard valves the piston rod is extended through the top of the cylinder head to indicate the position of the gate.

The type C air-motor control embodies the principal mechanical features of the type C electric unit, with an air motor connected to the driving worm in place of the electric motor. The motor is of balanced-type piston-valve construction, with four or more single-acting cylinders arranged in pairs.

Crane Company, 836 South Michigan Ave., Chicago, Ill. Feb. 11, page 227.

Streamline Fittings for Piping Systems

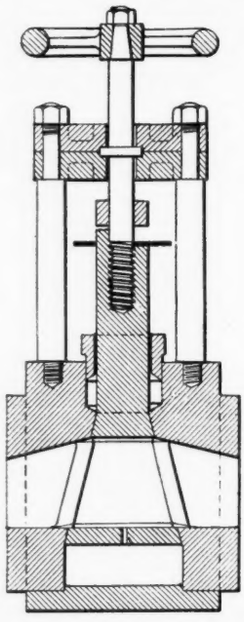
All pipe threads and flares are eliminated in this line of fittings for use with copper tubing in heating and other industrial applications. The joint consists of a thin film of solder between the tube and fitting. After the tube end has been cleaned and solder paste applied it is inserted in the fitting. The fitting is heated uniformly with a torch, and wire solder is fed through a drilled hole into the solder channel, from which it is distributed by capillary attraction. In addition to the regular streamline elbows, tees and couplings, special fittings are available with one outlet threaded.



Mueller Brass Company, Port Huron, Mich. Sept. 16, page 475.

Plug Valve With Non-Sticking and Scoring Features

Because the plug of this valve is unseated before it is moved to a new position either to open or to close the passage, freedom from sticking and scoring of the plug is assured. As the handwheel is turned, the plug is lowered slightly through the action of the screw, and as the wheel is turned further, the plug turns until the correct position is assumed. Then the wheel is reversed and the plug is again seated. An indicator on the stem shows the position of the plug. The valve is suitable for

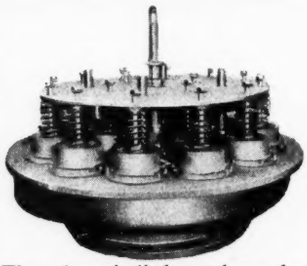


use with acids, solvents, oils and hot asphaltum.

Diamond State Machine Works, 12th and Madison Sts., Wilmington, Del. Sept. 2, page 401.

Multi-Port Valve for 125 Lb. Pressure

Lifting of each valve in this multi-port-type back-pressure valve is effected by pressure that builds up in a space between the head of the valve cylinder and plunger, which is attached to, and forms a part of, the valve seat. This pressure builds up or escapes slowly, through a small hole in the top of the plunger.



Thus there is little tendency for the valve to chatter.

For high pressures the valve is supplied with nichrome iron or cast-steel body; Everbrite valve disks, seats and cushion chambers; nitrided spindle; and alloy-steel springs. To facilitate adjustment of the valve the operating spindle is fitted with a roller thrust bearing and the handwheel with a reduction gear.

Cochrane Corporation, Philadelphia, Pa. Aug. 19, page 302.

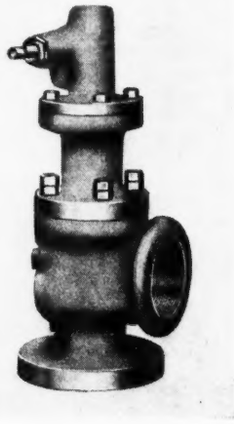
Expansive Compound for Sealing Joints

Q-seal plastic expansive compound is said to withstand high pressures and temperatures, to remain plastic and to expand when subjected to heat. It is suitable for sealing screw threads, gaskets and metal-to-metal joints on lines carrying steam, air, acids and oils. It can also be used as a paint to prevent rust and corrosion. It is put up in 3-oz., 1-lb. and 5-lb. tins, 10-, 30-, and 60-lb. containers, and 350- and 500-lb. drums.

Quigley Company, 56 West 45th St., New York City. Sept. 30, page 552.

Relief Valve With Pressure-Tight Lifting Lever

For use where back pressures may be encountered, this relief valve with a pressure-tight lifting lever is particularly adapted. The valve relieves automatically,



as in the case of any safety relief valve, but the disk can be lifted from its seat by means of the packed lifting gear without escape of liquid or vapor on the discharge side. On installations where back pressure may be encountered, the packed design prevents release of this pressure to the atmosphere.

Crosby Steam Gage & Valve Company, 10 Roland St., Boston, Mass. Jan. 20, 1931, page 123.

Swivel Flange for Welded Pipe Lines

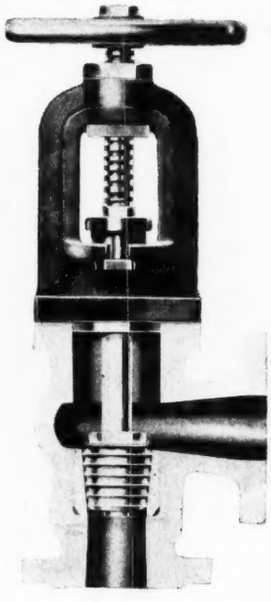
Where a joint is required in a welded pipe line for insertion of a valve or fitting, this swivel flange can be used to advantage.

It is available in sizes from 2½ to 10 in. It consists of a drop-forged steel flange, fitted to a drop-forged tapered nipple on which the flange may be rotated, permitting alignment of bolts. The tongue-and-groove type of flange can also be supplied.

Merco Nordstrom Valve Company, 343 Sansome St., San Francisco, Calif. Dec. 30, page 1062.

Multi-Stage Valve for Stop and Reducing Services

The principle of multi-stage expansion is employed in the design of this valve. A Venturi-shaped section of the valve body serves as the seat, and a plug of stainless steel fitted with six or more seating lands having



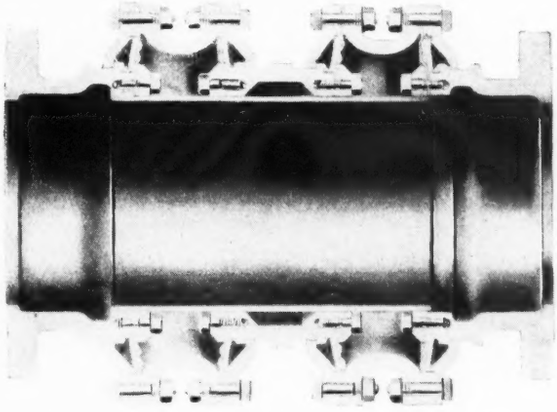
annular expansion chambers between them comprises what is usually termed the disk. The expansion chambers cause the total pressure drop to be distributed through several stages, resulting in low velocity, and minimize the effects of wire-drawing in the nearly closed or throttling positions of the valve.

Blow-off valves are available in sizes from 1½ to 2½ in. for pressures up to 600 lb. It is also available in angle and straightway patterns, in sizes from ¾ to 2½ in. For pressures up to 200 lb. the body is of cast iron, and for pressures above 200 lb. of cast steel. In all sizes the plug and stem are of stainless steel.

Multi-Valve Company, New London, Conn. March 11, page 408.

Multiple-Diaphragm Expansion Joint

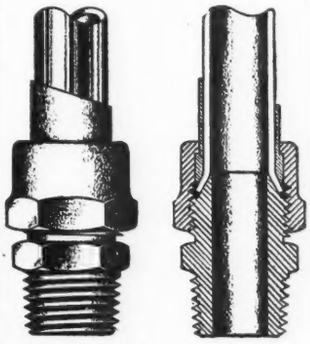
Flexibility is provided in this expansion joint by corrugated steel diaphragms clamped between flanges. All the pressure and movement of the diaphragms



is absorbed through sectional backing plates directly by the body of the joint. The amount of movement on any one diaphragm is controlled by inward and outward limit stops. Each diaphragm accommodates a full ¾-in. movement, and a sufficient number of these are added in multiple arrangement to suit the emperature variation and installation conditioned involved. An internal cylinder provides for a straight-through flow and prevents scale from accumulating in the joint.

The body is furnished in electric cast steel for temperatures up to 750 deg. F. and working pressures up to 400 lb. Cast-iron bodies are used for pressures up to 250 lb. and a total temperature of 400 deg. Joints are available in standard pipe sizes from 3 to 20 in. and can be furnished with ends beveled for welding.

American District Steam Company, North Tonawanda, N. Y. April 15, page 606.



Triple-Tube Coupling

This triple-tube coupling is intended for use where entering the tube into the coupling body is inconvenient, as is done in the standard coupling. It does not displace the standard coupling but is used where installation conditions require it in conjunction with that type. All parts of the coupling lock tightly when the nut is screwed on to the body.

Parker Appliance Company, 10320 Berea Road, Cleveland, Ohio. Nov. 11, page 774.

Wicking for Use on Brass Threads

Wicking of the proper size on a spool ready for winding on brass pipe thread is now available. It is furnished in three

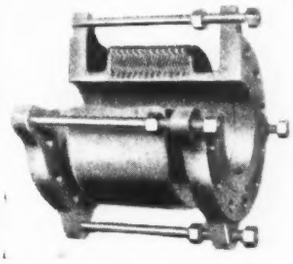
sizes, No. 1, for use on pipes up to ¾ in. diameter; No. 2, for pipes from 1 to 2 in.; and No. 3, for use on pipes from 2½ to 4 in. diameter.

Quick Products, Inc., 972 Broad St., Newark, N. J. Sept. 9, page 436.

Improved Expansion Joints

The expansion element of the "Flexo-Disc" expansion joint is a completely welded assembly of corrugated steel disks. The element is welded at each end to cast-steel flanged heads that are guided relatively to each other.

Joints of this type, with either flanged or welded ends, are now available for working pressures up to 30, 125 and 250 lb. A special design is used where

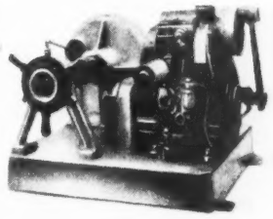


lateral or angular misalignment must be provided for and for service on lines handling corrosive liquids, gases or vapors.

Croll-Reynolds Engineering Company, Inc., 17 John St., New York City. Dec. 2, page 909.

Pipe Machine With Gasoline Engine Drive

No. 412 Power Boy is powered by a 1-hp., single-cylinder, 4-stroke-cycle, air-cooled Briggs & Stratton engine with a 2½-in. stroke. A hand starter is standard equipment and an Eclipse clutch is provided. The unit will thread and cut pipe up to 2 in. without an auxiliary drive.



With the auxiliary drive it can be used for 4-in. pipe.

Oster Manufacturing Company and the Williams Tool Corporation, Cleveland, Ohio. Aug. 19, page 304.

Square-End Pipe Cutter

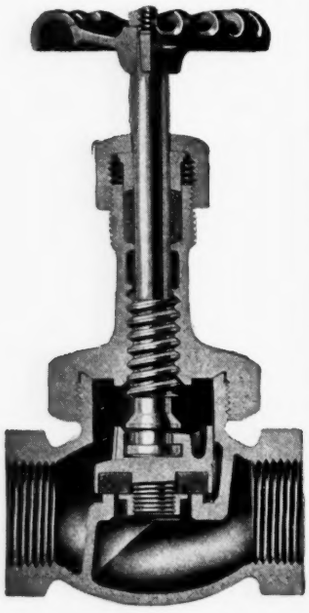
The standard Beaver principle of self-feeding knives is incorporated in this 2½-in. to 4-in. square-end pipe cutter. It is gear-driven, and has a driving pinion in front similar to No. 41 die stock. This permits interchangeability between pipe cutter and die stock when used with power drives. A single

wrench is employed for centering the tool on the pipe, by means of centering V-blocks, and the same wrench is used to place the knives under compression. The knives have a guide running ahead of the cutting edge to prevent breakage.

Borden Company, Warren, Ohio. Dec. 30, page 1063.

Valve With One-Piece Bonnet and Slip-On Disk Holder

Features of this line of standard bronze valves for 150 lb. steam working pressure or 250 lb. oil, water or gas pressure, are one-piece, screw-over bonnet and slip-on disk holder. The line is made in globe, angle, cross and check types in flanged and screwed patterns, and in all standard pipe sizes from ¼ to 3 in. Although regularly fitted with Jenkins standard renewable composition disks for 150 lb. steam pressure, they can also be had with special disks for hot or cold water, gas, oil and

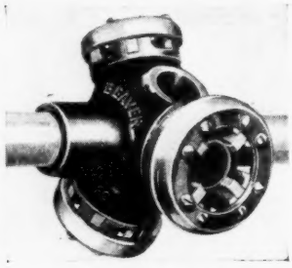


gasoline, or specially fitted for other liquids.

Jenkins Brothers, 80 White St., New York City. Oct. 7, page 590.

Three-Way Die Stock

In the Beaver three-way die stock large openings are provided for easy oiling and chip clearance. The die-retaining ring, which fits over the end of the die holder, is of pressed steel and is held in place by six screws. Dies and die-retaining rings are interchangeable with the No. 3 Beaver ratchet stock. The new stock is made in two sizes: No. 33 with a threading



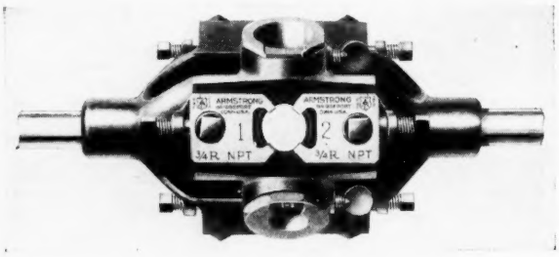
range of ⅜, ½ and ¾ in., and No. 34 with a range of ½, ¾ and 1 in.

Borden Company, Warren, Ohio. Oct. 21, page 665.

Three-Way Diestock

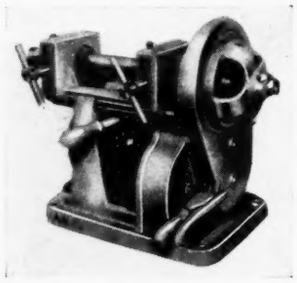
This adjustable three-way diestock is so constructed as to contain three sets of dies, each of which is adjustable for cutting over- and undersized threads. Several combinations of dies are possible with the one stock—three dies for three sizes of pipe—a die for brass or copper, or bolt and rod can be combined with two others. Two sizes are available, 60A, for pipe of ⅜, ½ and ¾ in., and 60B, for ½, ¾ and 1 in.

Armstrong Manufacturing Company, Bridgeport, Conn. July 29, page 192.



Pipe-Threading Machine With Revolving Die

In this machine the pipe remains stationary and the die is revolved. The pipe is gripped by two-jaw chucks, and the threading is done by a standard square die. Power is supplied by a ½-hp. compound-wound motor mounted beneath the pipe holder brackets. The machine is designed to handle work from ½ to 2 in., and attachments are available for the cutter head to

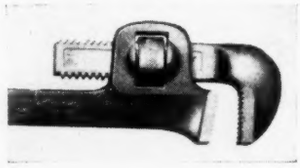


permit of cutting off, reaming and bolt-making.

Axelson Manufacturing Company, Ltd., Los Angeles, Calif. Aug. 19, page 303.

New Pipe Wrench

The two principal parts of the "Walco" pipe wrench, the



bar and the jaw, are of drop-forged high-carbon steel. The threads on the jaw are made with rounded crests to resist damage in use and to avoid jamming in the nut. A new design of nut provides a raised surface on each side of the knurl to protect it from battering. Sizes range from 6 to 48 inches.

Walworth Company, Boston, Mass. Dec. 30, page 1063.

Three-Way Threading Tool

Small, light weight and the ability to thread close to a wall or machine frame are features of this three-way threader for ⅜-, ½- and ¾-in. pipe. It

uses the same open-type die holders as the regular "Chip Chaser." Dies are arranged on the stock 120 deg. apart, with the proper size guide diametrically opposite each die.

Oster Manufacturing Company and the Williams Tool Corporation, Cleveland, Ohio. July 29, page 193.

Chain Tongs for Pipe and Fittings

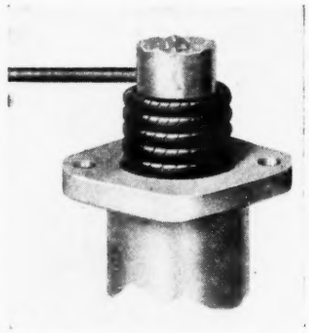
Reversible jaws with a toothed recess make this wrench readily adjustable to fittings as well as

to pipe. Parallel curved jaws for use on pipe have a toothed recess between them which assures positive grip on fittings. The change from the teeth first in use to a new jaw is made by simply unscrewing the bolt and turning the jaws end for end. Tongs equipped with either cable or flat chain, in a number of sizes to take pipe from ⅛ to 12 in., inclusive, are available.

J. H. Williams & Company, Buffalo, N. Y. Feb. 4, page 191.

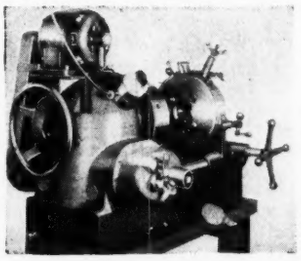
Semi-Metallic Packing in Rod Form

"Cordex" semi-metallic packing is composed of metal particles, asbestos fiber, binder and a specially prepared lubricant, the whole being incased in a



thin shell of viscous material. The packing is suitable for use with steam, water, oil, gas, ammonia, alcohol, brine and acids. It is available in all sizes from $\frac{3}{16}$ to 1 in., packed in 18-in. lengths in cartons from 5 to 20 lb. For low temperatures up to 500 deg. Gray Seal is used, and for higher temperatures up to 1,200 deg. Red Seal is recommended.

Metalastic, Inc., Union City, N. J. Sept. 23, page 513.



Portable Bench-Type Threader

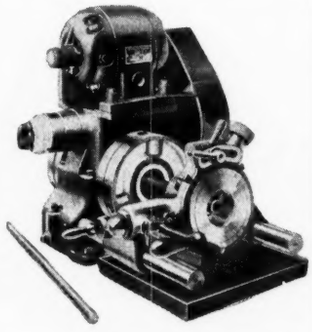
Features of this bench-type power threader are, built-in cutting-off, reaming and chamfering tools; built-in quick-opening die head that eliminates backing off; and two chucks—one a heavy gripping chuck and the other a self-centering universal chuck.

The machine will thread, cut, ream and chamfer all sizes of pipe from ¼ to 2 in., and is available in both bench and pedestal types.

Oster Manufacturing Company and the Williams Tool Corporation, Cleveland, Ohio. June 24, page 1004.

Small-Size Pipe Machine

Designated Tom Thumb, this machine will cut off, thread, ream and chamfer all sizes of pipe from ⅛ to 1¼ in. Its overall dimensions are only 18½ in. in height, 16 in. in width and 23½ in. in depth. It is driven through a V-belt by a ½-hp. universal motor that automatically adjusts its speed to the pull of the dies. A special bolt chuck is furnished for use with the



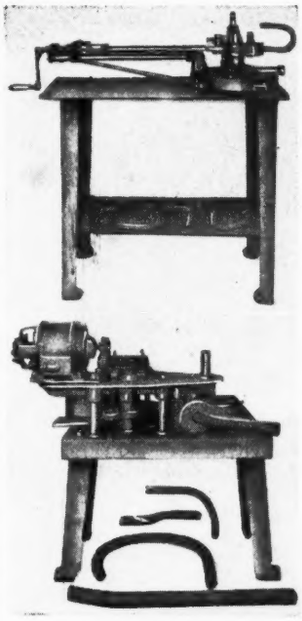
machine that makes it possible to thread bolts from ⅜ to 1½ in.

Oster Manufacturing Company and the Williams Tool Corporation of Cleveland, Ohio. Dec. 2, page 909.

Bending Machines for Tubing and Pipe

The thin gage tubing bender shown in the upper view is designed to handle all sizes of steel, brass and copper tubing (annealed) without heating or filling. Practically any bend, such as 45, 90 and 180 deg., offsets, compounds, etc., can be made without any change in the wall of the tubing. The dimensions of the machine are 42 in. long, 42 in. high and 20 in. wide.

The motor-operated machine is for cold-bending all sizes of steel, wrought-iron, brass and copper pipe of standard gage from ⅜ to 2 in., inclusive. Dimensions of the machine are 52 in.



long, 52 in. wide and 25 in. high.

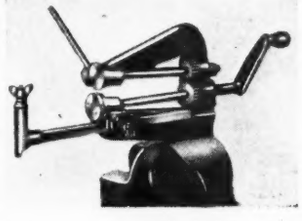
American Pipe Bending Machine Company, Inc., 37 Pearl St., Boston, Mass. July 1, page 37.

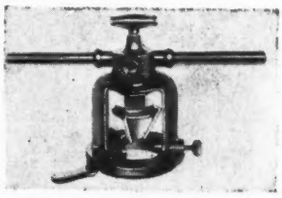
Gasket-Cutting Machine

Designed to cut gaskets in sizes from 2 in. up, this machine is adaptable to irregular shapes as well as to ring gaskets. The center bar is adjusted until the measurement indicating the desired diameter is even with the cutter. The bar is then locked in position and a lever moved until the cutter pierces the sheet, then the crank is turned clockwise and the outside of the gasket is cut off.

Provision is made in the design for taking up any lost motion in the cutter shaft and for maintaining proper clearance between cutters.

Allen Gasket Cutting Machine Company, 6 Hazard St., New Bedford, Mass. June 3, page 886.





Four-Inch Pipe Reamer

A screw feed the pitch of which is so designed that great pressure is exerted by the reaming blades eliminates the necessity of pushing against this tool to obtain sufficient pressure for a thorough reaming.

Although designed to be used primarily with the No. 414 Power Boy, put out by the same company, two additional handles may be used for manual operation. Reaming blades are renewable, and the body of the tool is made of malleable iron.

Oster Manufacturing Company and the Williams Tool Corporation, Cleveland, Ohio. June 10, page 921.

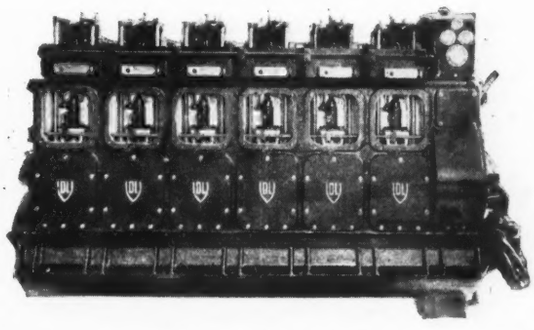
Prime Movers and Auxiliaries

Two-cycle diesels with improved injection systems, vertical uniflow steam engine designed for constant lead and variable cut-off, V-type engine with rotary valve, small steam turbines for special service and hydro-electric units for emergency lighting

High-Speed Diesel

In the design of this four-stroke-cycle high-speed unit the crankshaft, which is counterweighted, is forged from a single billet. Supporting bearings rest in the cross-members of the bedplate and are provided with circular steel shells, babbitt-lined. The frame is carried up to form the cooling water jacket, and the cylinder portion of the frame is cast with cross partitions that act as the passage in each cylinder head. Two admission valves are used, actuated by a pronged rocker arm and a push rod from the camshaft placed along the lower end of the cylinders.

Since the engine is intended for speeds ranging from 400 to 750 r.p.m., the piston material is of cast iron for slow speeds and of aluminum alloy for the higher ranges. The camshaft carries separate cams; the exhaust- and admission-valve cams are keyed to the shaft, with the



sage to convey the air from the intake manifold to the cylinder admission valves. Cast-iron liners are pressed into the frame to form the cylinders. Instead of the separate combustion chamber heretofore employed, direct injection into the working cylinder is used, the forced pump and injection valve being of Bosch design.

Air enters through a longitudinal manifold and passes through the passages already mentioned and then turns upward to enter the intake pass

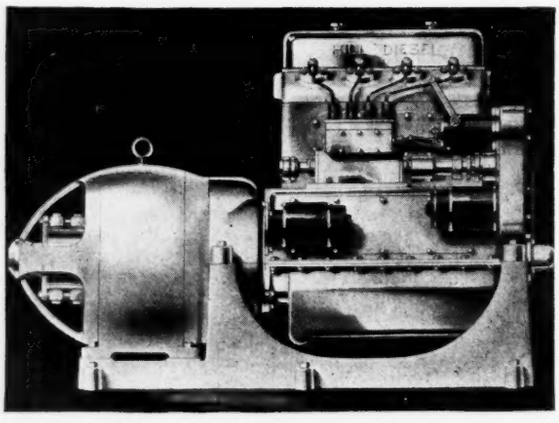
been obtained with a compression ratio of 13 to 1, giving a compression pressure of 420 lb. and a maximum combustion pressure of 700 pounds.

I. P. Morris & De LaVergne, Inc., Philadelphia, Pa. Dec. 23, page 1008.

Small Diesel Engine-Driven Generating Units

Particularly suitable for emergency lighting, excitation and other auxiliary service, this small unit is available in 10-, 15- and 20-kw. sizes.

It is a four-cylinder, four-stroke-cycle unit designed for speeds up to 2,000 r.p.m. and a rating of 40 hp. A governor controls the fuel admission and holds the speed within close limits. Fuel consumption at rated load is given as 0.44 lb. per horsepower-hour. Injection pumps, one for each cylinder, are combined into one unit, as also are the water and oil pump. A filter is provided on both fuel and lubricating oil. Specifications of the 20-kw. size, are: speed, 1,750 r.p.m.; weight,

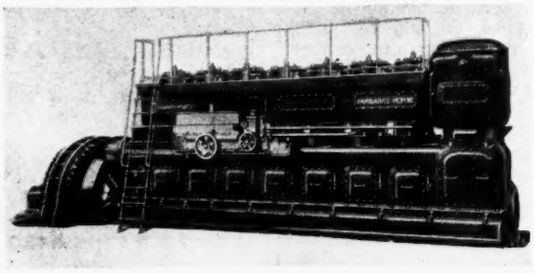


1,600 lb.; length, 63 in.; width, 28½ in.; and height, 42 inches.

Hill Diesel Engine Company, Lansing, Mich. Dec. 2, page 908.

Direct-Injection Two-Cycle Diesel

The injection of the fuel directly into the engine cylinder (in place of the precombustion chamber arrangement heretofore used), the employment of a multiple-orifice spray nozzle, and a separate scavenging pump in place of crankcase scavenging, constitute important improvements recently made to this two-stroke-cycle mechanical-injection diesel. The new-design injection nozzle, which is mounted in the center of the cylinder head and secured by two bolts, jets its oil directly into the cylinder. It contains a spring-loaded needle valve which has a lapped fit in a bushing, or guide. Fuel is



forced by the injection pump into the space between the guide and the nozzle body, and when the pressure builds up sufficiently it lifts the needle valve against the spring tension, the shoulder on the lower end of the valve acting as a piston. When the valve is lifted from its seat the fuel is injected in the form of a fine spray through several holes in the tip. All parts of the nozzle that come in contact with the fuel are of non-corrosive material. The only adjustments are for lift and spring tension.

These improvements have resulted in a more intimate mixture of fuel and air, and, consequently, better combustion and a lower fuel consumption Starting is easier and low-speed operation is improved. The fuel guarantee on engines with 16x 20-in. cylinders is 0.41 lb. per brake horsepower-hour at full load; 0.43 lb. at three-quarters; and 0.46 lb. at one-half load.

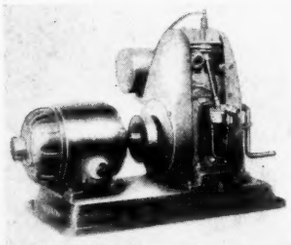
Fairbanks, Morse & Company, Chicago, Ill. May 20, page 776.

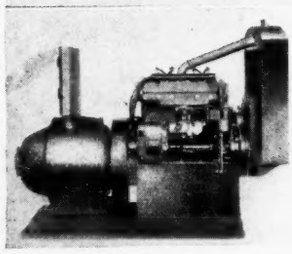
Portable, Self-Contained Electric Lighting Plants

Made in a number of sizes ranging in capacities from 350 watts to 15 kw., these units are completely self-contained and operate without the use of a storage battery or other accessory.

In the single-cylinder units a 110-volt compound-wound generator is connected through a flexible coupling to a four-stroke-cycle, air-cooled engine equipped with a high-tension magneto. The coupling is of special design having a torsion spring arrangement to absorb the explosion impulses.

Four-cylinder water-cooled units are available in a number of sizes, ranging from 1½ to 15 kw. direct-current, in either 110





or 220 volts. Certain types can be had for 32-volt circuits. Other units included in the line are a 400-watt, 12-volt battery-charging set; single-cylinder units with take-off pulley; and units complete with sheet-metal housings. Units are also available for operation on natural gas.

Sullivan Machinery Company, 400 North Michigan Ave., Chicago, Ill. Dec. 30, page 1061.

Gasoline Engines Use Distillate Oil as Fuel

"Blue Streak" engines equipped for the burning of distillate oil in place of gasoline are produced in sizes ranging from 70 to 200 hp. The bore and stroke are 5½x6½ in., 5¾x6½ in., and 6x7 in. in the four-cylinder models, and 6x7 in. in the six- and eight-cylinder models.

Crankshafts are drop-forged, heat-treated, and are made of alloy steel in the larger sizes. The main bearings are babbitted and bronze-backed. Valves are in the head of the motor and are fully inclosed, the intake being made of nickel steel and the exhaust of silichrome.

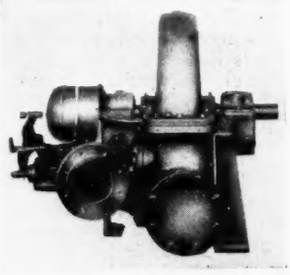
To permit of higher power output and higher compression heads, water is injected into the intake manifold for throttle positions greater than three-quarter opening. This is controlled automatically.

Climax Engineering Company, Clinton, Iowa. June 24, page 1005.

Steam Turbine for Auxiliary Drive

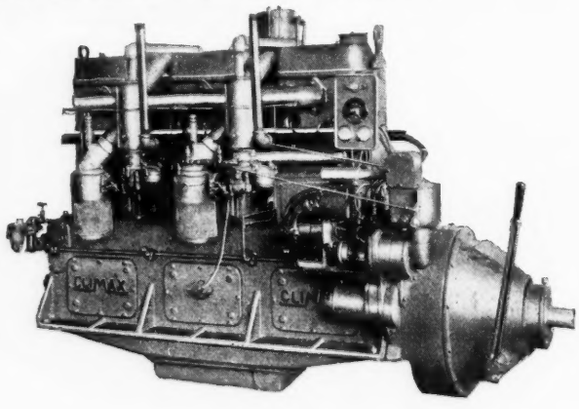
Type D58 steam turbine is suitable for driving fans, pumps and similar industrial equipment and is designed for operation at steam pressures up to 250 lb. and speeds between 1,200 and 4,000 r.p.m., with capacities up to approximately 250 horsepower.

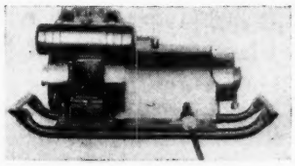
The turbine is supported at the center line to permit expansion without affecting the shaft alignment. It is equipped with



speed-regulating and emergency governors and is fitted with carbon shaft packing.

General Electric Company, Schenectady, N. Y. Jan. 13, 1931, page 83.





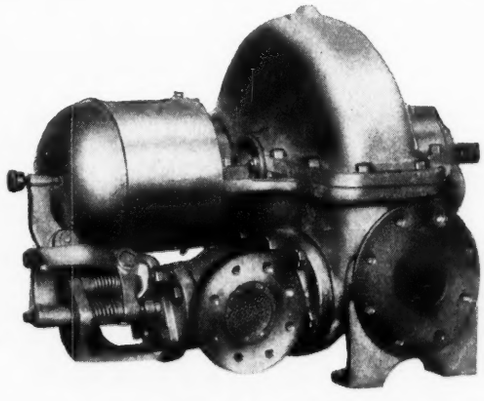
Small Portable Power Unit

Although this portable power plant weighs only 120 lb., it is capable of delivering 1,000 watts. It is powered by a gasoline engine developing 2 hp. at 4,000 r.p.m. An automatic mechanical governor provides accurate speed adjustment between 1,800 and 4,000 r.p.m. There is only one exposed moving part. All other parts are inclosed in a sealed bath of oil. The unit is provided with duralumin skids to facilitate transport.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa. Sept. 30, page 552.

Mechanical-Drive Non-Condensing Turbine

Designed for non-condensing service, this small steam turbine is suitable for driving centrifugal pumps, fans and similar industrial equipment operating, in general, at speeds between 1,750 and 3,600 r.p.m. The unit is built only in single-stage, with two rows of revolving buckets. The wheel casing is split horizontally, and the steam and exhaust pipes are connected to the lower half of the machine. A centrifugal governor provides speed regulation, and an independent emergency governor is included.



General Electric Company, Schenectady, N. Y. Nov. 18, page 814.

Turbine for Wide Range of Operating Conditions

This multi-stage unit is especially designed to cover a broad range of power and speed and to meet certain heat-balance conditions. It is equipped with five governing controls, and, in addition, three safety devices.

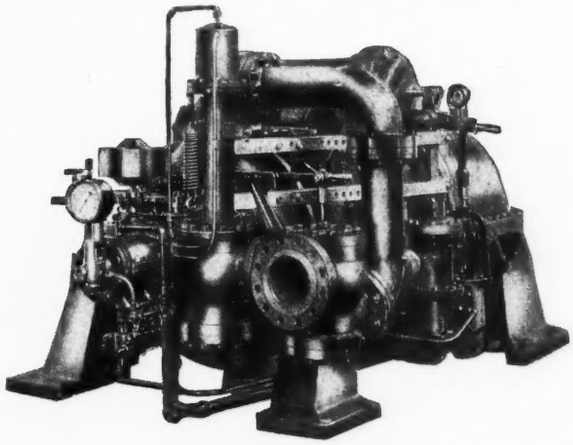
The unit is designed to develop, normally, 500 to 750 hp. at 3,600 to 3,750 r.p.m., the speed being controlled from the outlet pressure of the gas booster, to which it is directly connected. In emergency the unit can be speeded up to 4,500 r.p.m. to develop 1,480 hp. The steam conditions for which the unit is designed are, inlet pressure, 350 lb.; superheat, 100 deg.; and bleeder pressures, 125 and 10 pounds.

By means of an automatic control steam is delivered from or taken into the 10-lb. connection, the admission of steam at this bleeder point being also under control of the speed governor, but only after the high-pressure steam has been shut off.

Moore Steam Turbine Corporation, Wellsville, N. Y. Jan. 27, 1931, page 162.

Multi-Cylinder V-Type Steam Engine

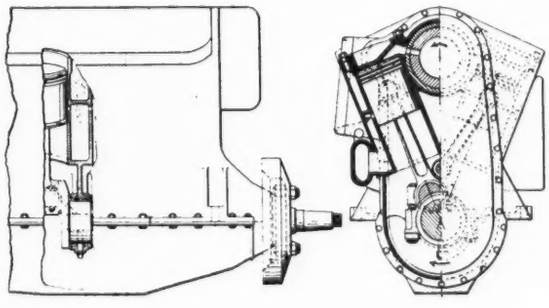
Ability to operate at a wide range of speeds and pressures is one of the important features of this multi-cylinder, V-type, single-acting, uniflow-exhaust steam engine. The unit has a rating of 45 hp. at 150 lb. pressure and 400 r.p.m., and a rating of 240 hp. at 300 lb. pressure and 1,500 r.p.m. Correspondingly higher horsepowers are developed with higher pressures, the engine being designed for 1,000 pounds.

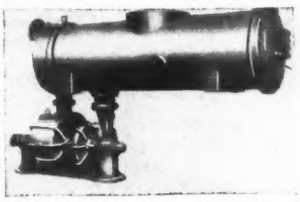


The unit has eight cylinders (4½-in. bore and 5-in. stroke) laid out in a 45-deg. angle, with four cylinders on each side and with a rotary valve housing integral with the engine block lying between the two rows of cylinders. The steam-admission valve, a rotating steam chest mounted in a roller bearing at each end, admits steam to the cylinders through ports at opposite angles in the valve.

Provision is made in the design of the valve-operating mechanism to permit of varying the lead, and, consequently the compression, to give the best operating performance at the wide range of speeds, 50 to 2,000 r.p.m. This feature permits of changing the horsepower and torque characteristics of the engine to suit the steam pressure and service with which the engine is being used.

Baker Motors, Inc., 17 East 42d St., New York City, a subsidiary of the General Syndicate, Inc. April 22, page 647.





Unit-Type Surface Condenser

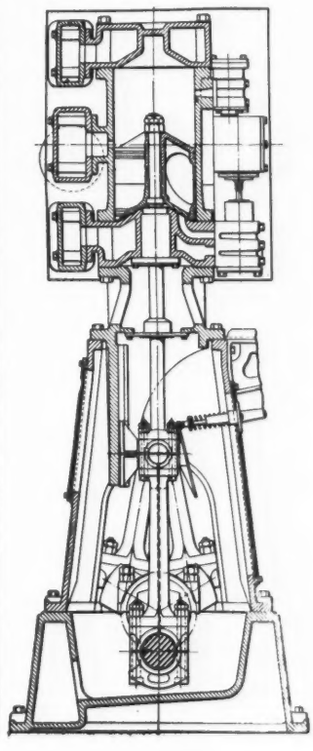
To simplify the installation of a surface condenser and its auxiliary equipment in small power and industrial plants the unit-type condenser shown has been developed. The circulating and condensate pump are attached directly to, and are located underneath, the shell of the condenser. The two pumps are mounted on one base, with their impellers on a common shaft and arranged for driving with a single motor. The complete unit is placed beneath the prime mover it serves, thereby reducing to a minimum the amount of space required.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa. March 11, page 410.

Three-Cylinder Vertical Uniflow

An improved valve gear that with flat-faced cams gives constant lead with a variable cut-off, and that can operate at comparatively high speeds is a feature of this vertical uniflow engine.

The engine is of the three-

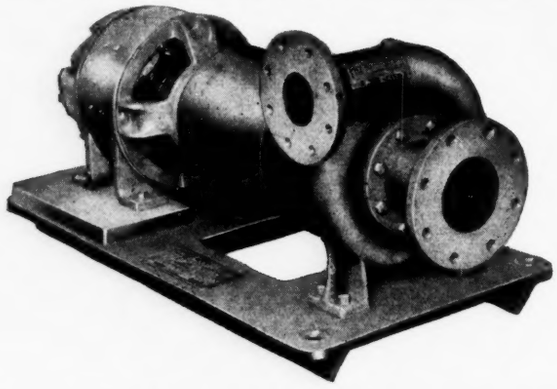


cylinder type, cylinders being cast separately, and it is equipped with the expansion-compensating, double-seat poppet admission valves that are used on horizontal Skinner engines.

Auxiliary exhaust valves are of the single-beat poppet type, located away from the ends of the cylinder, as in the horizontal construction, and are built to disengage automatically from their cams and remain closed for condensing operation.

Crosshead and pins are made from a single-piece forging, into which the piston rod is inserted and locked by a specially designed lock nut. A marine design is used in the connecting rod construction.

To operate the valve two camshafts are employed, on one of which are mounted cams for opening the admission valves and cams which operate the auxiliary exhaust valves.



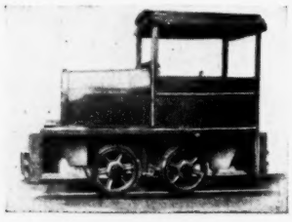
The second camshaft carries the cams for closing the steam valves.

All important bearings, including the crosshead and guides, are lubricated by oil with a pressure of approximately 25 lb. Oil from the valve gear returns through the governor housing to the crankcase, amply lubricating all the governor parts and all vertical shaft bearings. Cylinder lubrication is accomplished by an adjustable forced-feed pump.

The Skinner Engine Company, Erie, Pa. March 18, page 425.

Gasoline-Motor-Powered Industrial Locomotives

Made in five sizes ranging from 2 to 4 tons' capacity, this gasoline-engine-powered locomotive is particularly suited to the handling of ash-disposal cars in larger power plants, refineries, etc., and other haulage in the industrial field.



It has a Ford AA power unit, including a heavy-duty single-disk clutch and four-speed truck transmission. All four forward speeds, giving 2 to 16 miles an hour, are available in reverse through either of two types of drive.

Brookville Locomotive Company, Brookville, Pa. Oct. 21, page 665.

Hydro Plant for Emergency Lighting

This self-contained direct-connected hydro generating unit may be operated from the plant or city water pressure and used to provide emergency lighting in industrial plants, public buildings, etc. The unit is built in the following sizes of inlet, 2½, 3½,- 5-, 8- and 12-in., and the head range is from 10 to 100 ft., with special runners for higher heads.

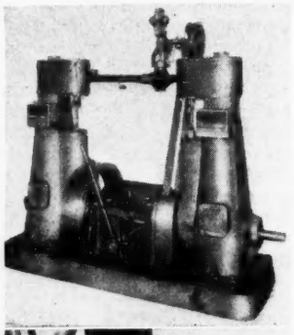
A positive-type governor is incorporated in the unit and is totally inclosed. Direct- or alternating-current generators are supplied regularly, at voltages of 125 to 250 volts in capacities up to 20 kilowatts.

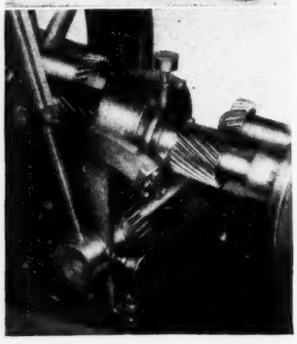
Fitz Water Wheel Company, Hanover, Pa. Jan. 20, 1931, page 122.

Engines With Adjustable Cutoff and Reverse

An improved mechanism for adjusting the cutoff and reversing is incorporated in this line of single- and twin-cylinder engines. Comprising this reversing mechanism is an operating lever, arranged to rotate, by means of wide and narrow spiral gears, the pins on which the eccentrics are mounted, thus changing the position of the eccentrics, and, consequently, the cutoff and stroke of the valves.

For reversing engines the center of the quadrant is the neutral position. Moving the level to either side of the neutral point determines the direction in which the engine will run.





Troy Engine & Machine Company, Troy, Pa. April 29, page 686.

Spherical Thrust Bearing

This spherical thrust bearing not only takes care of the thrust of the shaft but by virtue of its design adds a steadying force to hold the shaft in a central position.

A number of spherical shaped shoes are supported by a base ring and held in position by a sectional retaining ring. This construction allows of removing any of the shoes without disturbing the others. Provision is made for up and down as well as central adjustment. The bearing is made in two types, concave runner type for use above a waterwheel, or of the convex runner type for use below the rotor of a generator.

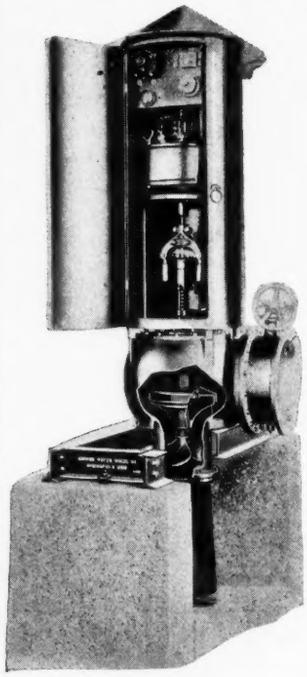
Kingsbury Machine Works, Philadelphia. Pa. June 17, page 944.

Small Hydro-Electric Plant for Emergency Lighting

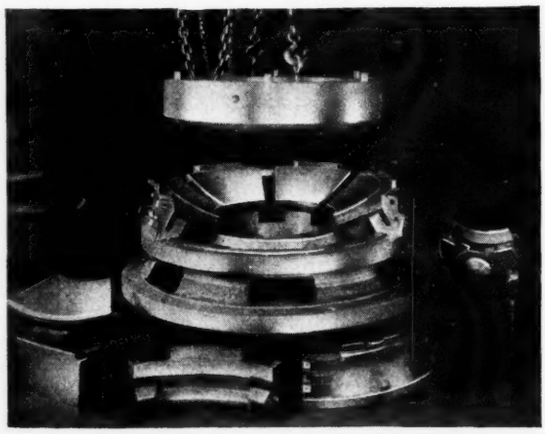
Completely inclosed and self-contained, with the governor, generator and switchboard mounted in a cylindrical sheet-metal housing, this small hydro-electric plant is suitable for generating light and power from small low-head streams and for use as an emergency lighting set in power and industrial plants and buildings.

Water admitted to it is regulated by a cone-shaped valve operated by the governor. The operating parts, including the generator armature, runner and shaft, are carried on ball bearings in the generator.

The unit is available in four regular sizes of ½, 1, 3 and 5 kw. capacity, suitable for water heads from 8 ft. to 21 ft. Special sizes can be furnished for higher heads.

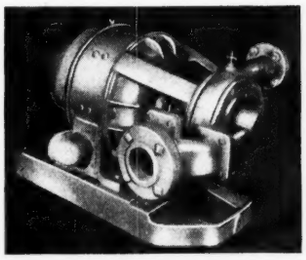


Hoppes Water Wheel Company, Springfield, Ohio. April 22, page 646.



Pumps for Power Plant and Industrial Uses

Propeller-type pump for circulating-water service, centrifugal pump with single-vane impeller and a unit of axial-flow design for high consistency fluids are recent contributions



Unit-Type Double-Suction Pump

In the Jennings double-suction centrifugal pump built in capacities ranging from 75 to 500 gal. per minute, the pump and motor are built together, with four brackets integral with the motor end shield supporting the pump casing. The extended motor shaft carries the centrifugal impeller, the only bearings in the unit being those in the motor. The pump is bronze-fitted throughout and has bronze solid sealing rings. The suction is connected to the inner and outer heads through a common "Y" connection.

Nash Engineering Company, South Norwalk, Conn. April 22, page 648.

Single-Stage Double-Suction Pump

In classes BMD and BHD single-stage centrifugal pumps a bronze impeller of the double-suction inclosed type is carried by a shaft of special alloy stainless steel running in deep-groove ball bearings inclosed in sealed housings. Suction and discharge connections as well as the bearing-brackets are cast integral with the lower half. Unusually deep stuffing boxes with brass water seals, solid bronze glands and bronze swing bolts are used. A number of sizes and capacities are available.

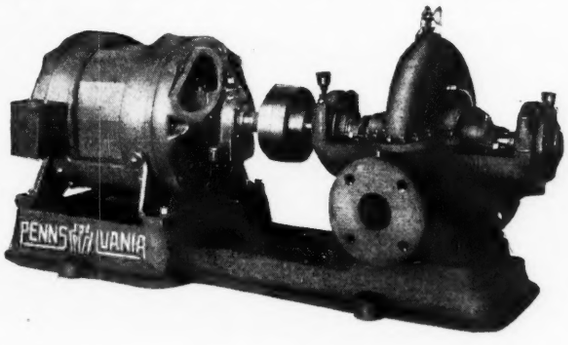
Pennsylvania Pump & Compressor Company, Easton, Pa. Feb. 18, page 267.

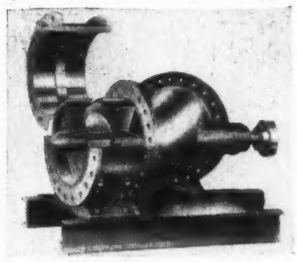
Floating Pump Valve

In the improved Williams pump valve the legs used to guide the disk have been shortened and the top of the cage has been enlarged to an annular ring of the full valve diameter.

The ring is recessed to seat an inverted beehive Monel metal spring that holds the valve disk to its seat. Application of these valves to the ports of a pump tends to eliminate frictional wear, remove obstructions to flow and reduce slippage to a minimum. They are suitable for a variety of services.

Williams Gauge Company, 343 South Dearborn Street, Chicago, Ill. June 3, page 885.





Axial-Flow Pump

In its ordinary form this axial-flow pump consists of an impeller with three to six blades operating between two sets of guide vanes in a section of the pipe conveying the fluid. An internal bearing is carried by a boss supported by the outlet guides, and the shaft is carried out through a stuffing box, which also supports the thrust bearing.

Another form made specially for high-consistency fluids has two impellers revolving in opposite directions in a section of the pipe, the advantage of this type being that no guide vanes are necessary. In both types of pump the flow is kept axial by a special distribution of pitch of the impellers.

Pumps of the single-impeller type are available in sizes from 200 to 90,000 g.p.m. In addition to water-pumping they are used for pumping such special fluids as fused nitrates and caustic soda at temperatures approaching dull red heat. These pumps can be had of special Fultonite nickel chromium in sizes to suit practically every purpose.

Fulton Iron Works Company, St. Louis, Mo. Dec. 30, page 1062.

Hydro-Acid Pump

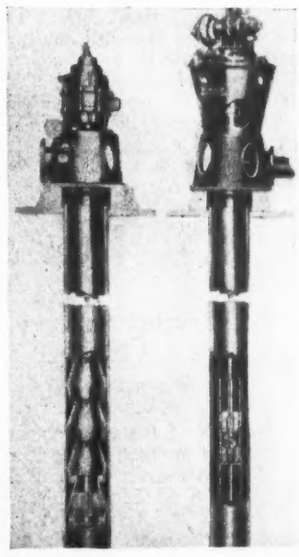
In this hydro-acid pump designed to handle any acid in concentrations not injurious to rubber, a plunger pump driven by a geared motor furnishes pressure and suction impulses through the medium of water or any suitable liquid to the outside of a sack contained within a cylinder. By this squeezing and suction action the sack pumps the acid. The stroke of the plunger pump is adjustable to any desired capacity.

The pump is also built in another model to mount on a mixing tank or on a vat in such a way that the pump may be driven off an eccentric on the horizontal shaft operating the agitator within the tank. The acid portion, together with the cylinder, can be furnished to attach to any pump of suitable capacity, between the pump and the check valve. All models are self-priming, and sizes available range from 10 to 300 g.p.m.

American Water Softener Company, Philadelphia, Pa. May 20, page 798.

Turbine and Screw-Type Deepwell Pumps

Special laminated bearings of resilient material which requires no lubrication are used in the "Multipellor" turbine pump direct-flow type and the screw-type direct-flow unit. The shaft carrying the impellers and water load rotates on, and is carried by, two annular thrust bearings

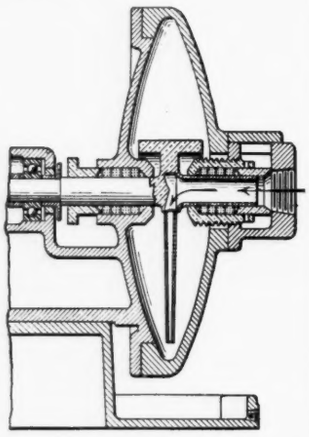


built into the motor or pump head. This special design of bearings precludes possibility of contaminating the water with oil and lessens danger of injury to the pump when handling sand-laden water. In addition to the motor- and turbine-driven heads shown, a head suitable for belt drive from engine or line-shaft can be furnished.

Luitwieler Pumping Engine Company, 123 Ames Street, Rochester, N. Y. July 15, page 115.

Centrifugal Pump With Single-Vane Impeller

A hollow vane of streamline section with knife edges constitutes the impeller in the Type O single-stage centrifugal



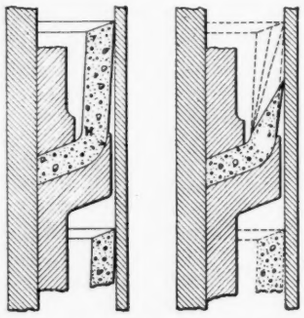
pump. The shaft, impeller hub and suction tube are cast in one piece from stainless steel. Water or other liquid is drawn in at the center and discharged through the vane at high velocity.

Two deep-groove ball bearings mounted in sealed housings carry the load of the shaft and impeller, and a flexible coupling is used. The pump is made in a range of capacities from 5 to 35 g.p.m. for heads from 40 to 300 feet.

American Steam Pump Company, Battle Creek, Mich. April 15, page 608.

Cup Leather Spacing Rings for Plunger Pumps

Transfer of the wear on cup leathers of plunger pumps from the heel to the vertical wall of the cup is effected by this design of spacing rings. The rings have been modified to afford a seat for all of the horizontal portion of the cup leather. Because the leathers are molded with an obtuse instead of a right angle at the heel, there is less likelihood of tearing or

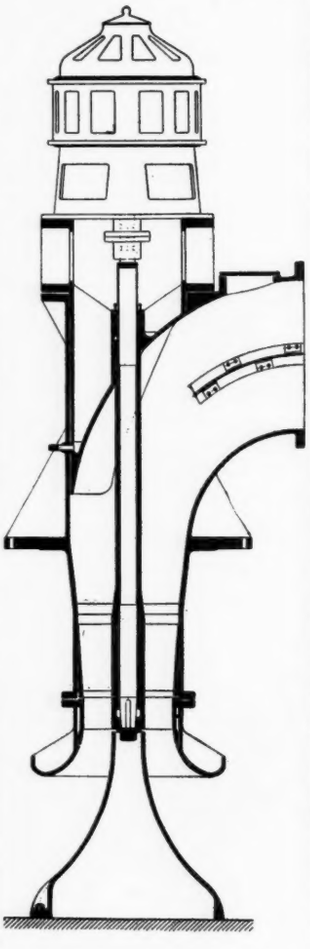


breaking the fibers, as wear progresses from the top down. By maintaining alignment of the cup leathers the new spacing rings prevent metal-to-metal wear, and elimination of friction on the down stroke lessens the tendency of the pump rods to buckle in compression.

A. D. Cook, Inc., Lawrenceberg, Ind. May 13, page 760.

Vertical Propeller-Type Pump

Inherently suited to the handling of large volumes of water at low head, this vertical propeller-type pump is particularly adaptable to condenser circulating-water service. The water is guided into the propeller



through the nozzle formed by a guide cone and the bell-shaped end of the pump. After leaving the propeller the water passes through guide vanes and thence into the body of the pump, which takes the form of a diffuser, wherein the velocity is reduced and converted into pressure. A splitter is installed in the discharge elbow to reduce the losses at that point.

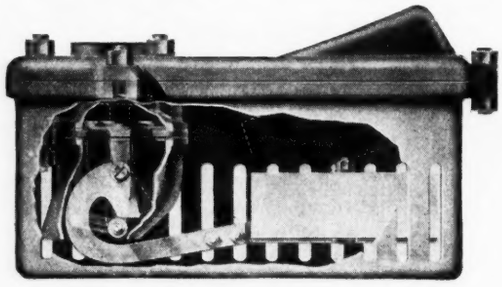
The propeller rotates in a renewable liner of bronze or other suitable material. A water-lubricated rubber bearing in the center of the guide vane casting takes the radial load. The guide vanes, propeller and shaft assembly can be withdrawn from the pump for inspection or repair without interfering with the casing and piping, by removing the motor and the bearing-supporting plug at the top of the pump.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. Jan. 13, 1931, page 62.

Automatic Suction Valve for Sump Service Pump

The use of a single pump to empty a number of sumps that are located reasonably close together, although at different levels, in place of a separate pump in each sump is made possible by the use of this valve.

The valve is float-controlled, but not float-operated. It is closed, and locked in that position, by the weight of the float acting through an arm against a roller attached to the valve stem. Opening and closing of the valve is accomplished by snap action. It is compact and can be installed in almost any



location. The exterior casing of a 2-in. valve is only 8½ in. high and 10x15 in. in area. Where corrosive water is to be encountered all parts of the valve, including the casing, may be made of special materials.

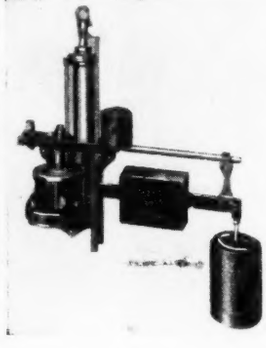
La Bour Company, Inc., Elkhart, Ind. Jan. 20, 1931, page 120.

Regulators and Controllers

Feed-water, excess-pressure and damper regulators; automatic-ratio, liquid-level and remote manual controls

Hydraulically Operated Damper Regulator

Two important characteristics, sensitiveness and step-by-step movement of the operating mechanism, are embodied in No. 503 Victor regulator. At normal pressure the operating lever is balanced by the steam pressure below the diaphragm at a point where a discharge port in the stem of a pilot valve is closed. In this position no water enters or leaves the cylinder and the piston remains stationary. With an increase in the steam pressure the lever rises, admitting water to the lower end of the cylinder and causing the piston to move upward. As the piston rises, by means of a rack and pinion, a weighted arm is moved outward to a point where the increase in weight causes the operating lever to descend and close the



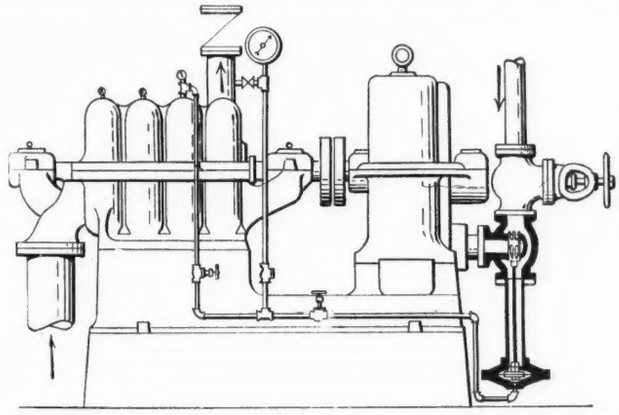
pilot valve, shutting off the water pressure to the lower side of the piston. The piston remains stationary until further change in the boiler pressure, at which time the cycle is repeated. A shut-off valve and strainer are incorporated in the water inlet fitting.

Atlas Valve Company, 282 South St., Newark, N. J. Sept. 16, page 475.

Feed Pump Excess-Pressure Regulator

Substituting a combined steam and pump pressure control arrangement for the mercury column in the standard Mercon regulator, has given an unusually simple and effective excess-pressure regulator for steam-driven boiler-feed pumps.

A steam control valve of the standard balanced-piston type operated by a thin diaphragm of relatively large area is installed in the steam line to the turbine. From the discharge of the pump a ¼-in. pipe connection is made to the lower part of the diaphragm chamber. In this



pipe are a stop valve, an orifice of small diameter protected by a strainer, and a needle valve. To this line, between the orifice and needle valve, a pipe connection is made from one of the intermediate stages of the pump, a needle valve being inserted in the line. By proper adjustment of these valves any difference between zero and the head developed by the last stage of the pump can be obtained. If still higher differential is required, the second pressure connection can be made to a lower stage. The strainer and orifice may be cleaned while the regulator is in service or it can be backwashed under high pressure.

Mercon Regulator Company, Chicago, Ill. Nov. 11, page 773.

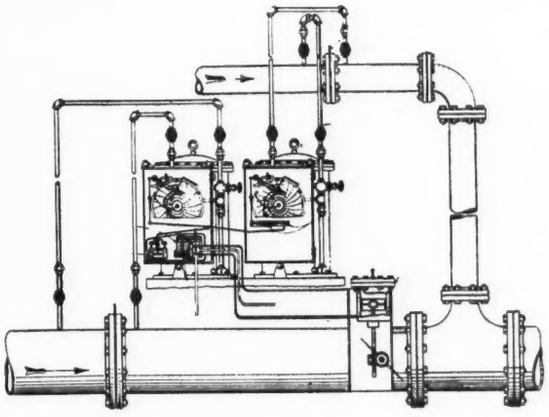
Automatic Ratio Control for Mixing Gases and Liquids

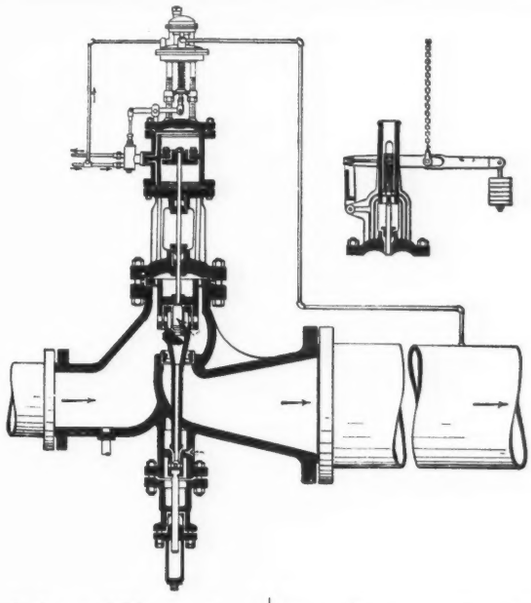
The illustration shows the Bailey ratio control for mixing gases or liquids in any desired proportion arranged to automatically proportion blast-furnace gas and coke-oven gas. Any change in the rate of flow in the coke-oven gas line is immediately reflected by the gas meter connected to that line. The recording mechanism of this meter is connected through a system of linkage to a pilot valve, stabilizer and gas meter, which, in turn, is connected to the blast-furnace gas line.

The stabilizer tends to counteract the impulse given by the coke-oven gas meter. This is secured by connecting the "more" oil line to the upper chamber of the stabilizer and the "less" oil line to the lower chamber of the stabilizer. As pressure is applied to the "more" oil line, and the "less" side is open to drain, the stabilizer piston moves downward and returns the pilot valve to a neutral position, which, in turn, equalizes the pressures on either side of the stabilizer, causing it also to take a neutral position.

Any desired ratio between the two component parts of a mixture can be secured by selecting the proper ratios for the meter orifices. A further adjustment or change of ratio can be had by use of the ratio-changing device, which is simply a movable pivot supporting the linkage in the right-hand meter casing.

Bailey Meter Company, Cleveland, Ohio. Sept. 2, page 401.





Balanced Venturi Reducing Valve

This single-seated balanced Venturi reducing valve is designed for working pressures from 250 to 450 lb. and to give accurate regulation with smooth flow of steam. A long tapered disk having a long travel regulates the steam passing through the valve, and the outlet side of the valve body is made Venturi shape to allow expansion of the steam down to the specified reduced pressure.

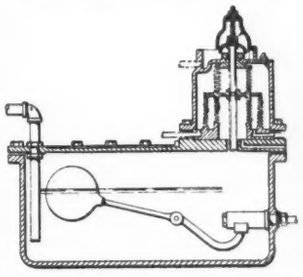
To provide a balanced valve and reduce the power required to operate it, the disk is made hollow and fitted with a pilot valve through which the high-pressure steam reaches the lower side of the bottom piston. Operation of the valve is by means of the hydraulic cylinder under control of the regulator.

Where the regulator must necessarily be separated from the valve, a weighted lever is attached instead of a hydraulic cylinder. The valve can also be had arranged for electric motor operation. In this case it is fitted with a screw spindle and connected to the driving motor by means of a reduction gear. Sizes range from 2 to 12 in., inclusive.

Schutte & Koerting Company, Philadelphia, Pa. Dec. 16, page 988.

Air-Balanced Proportioner for Corrosive Solutions

The air-balanced proportioner illustrated is especially adaptable to feeding sulphuric acid solution into boiler feed water. The corrosive solution is held at a constant level in a feed tank by a float-regulated valve which controls inflow from a source of higher pressure, while the outflow of the corrosive solution is through an orifice. The pressure acting upon the



outflow orifice is determined by the air pressure above the liquid level in the solution tank. This pressure is regulated automatically by a balancing device consisting of three corrugated bellows, all attached to a single movable diaphragm whose position is transmitted to a valve at the top.

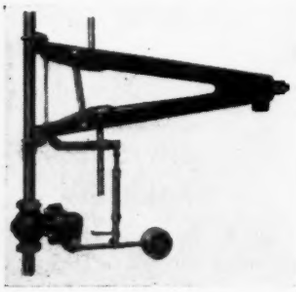
The surface of the diaphragm contained within the inner pair of bellows is acted upon beneath by air pressure within the feed tank, while the upper surface is open to the atmosphere. The annular portion of the diaphragm outside of the inner bellows and within the outer bellows is acted upon on its

upper surface by the pressure from the upstream side of an orifice in the primary flow pipe, and upon its under side by the pressure from the downstream side of the same orifice. Discharge from the feed tank is led through a tunnel and pipe to the mixing apparatus, where air or mechanical agitation is used.

Cochrane Corporation, Philadelphia, Pa. June 17, page 961.

Feed-Water Regulator for Horizontal and Scotch Marine Boilers

Copes type OT feed-water regulator is designed for use with horizontal return-tubular, Scotch marine and other boilers of similar type. The thermostat is made up of two short tubes connected at an angle by a heavy bronze bend. Both tubes are in tension, and the operating effect is that of a



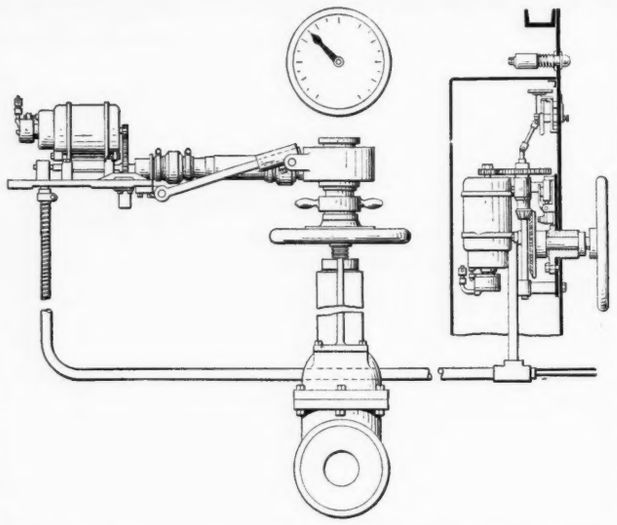
single tube. The standard Copes regulating valve is used.

When installed with the regulating valve in a vertical feed line, the thermostat is clamped to the feed line and no other support is necessary. If the valve goes into a horizontal line the thermostat is supported from the horizontal feed line. Regulating valves for use with the type OT range in size from ¼ to 2 inches.

Northern Equipment Company, Erie, Pa. Dec. 23, page 1025.

System of Remote Manual Control

The De Florez system of remote control, which employs the Selsyn motor, makes it possible for an operator to maintain manual control of a valve or other similar device from a distance. The actual work of opening or closing the valve is done by the operator in the control room or at some point distant from the valve, the power or work being transmitted between the two points by the Selsyn motors. With this arrangement the power transmitted to the receiving mechanism is only that which is given to the transmitting



wheel by the operator. Thus the resistance to motion can be felt and the amount of movement observed on the wheel in the same manner as when turning the valve itself.

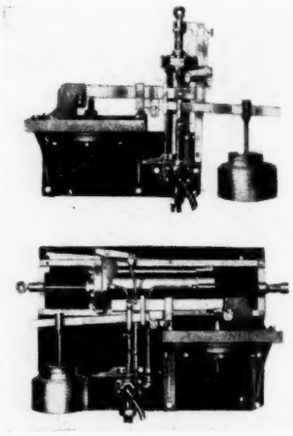
A quickly detachable clutch is inserted between the handwheel and the worm drive so that the mechanism can be disconnected quickly if desired to operate the valve independently. The control is equally well adapted to stationary and rising-stem types of valves.

Brown Instrument Company, Philadelphia, Pa. July 22, page 152.

Improved Automatic Damper Regulator

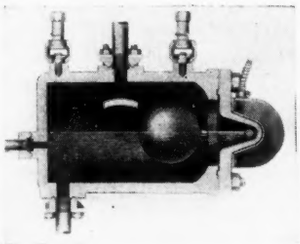
The sensitiveness of Model DD regulator is attributed to the unusually small travel of the diaphragm (1/100 of an inch) and of the pilot valve $\frac{1}{32}$ in). Fulcrum bearings on the end of the lever above the diaphragm are close together, and the pilot valve is close to the main fulcrum bearings, which tends to increase the power of the diaphragm and reduce the friction.

The unit is designed to function on ½-lb. change in steam



pressure and to make a number of uniform stops or steps in closing and opening, according to the demand on the boilers. It is particularly suitable for individual boiler control, or as a master control for a battery of boilers, and can be supplied with 2-, 3-, 4-, 5-, or 6-in. diameter cylinders, with 6-, 8-, or 10-in. piston travel. Compensators are provided which can be adjusted so that the regulators will make the full travel of the piston a step at a time on any variation of steam pressure up to 15 pounds.

Defender Automatic Regulator Company, St. Louis, Mo. June 17, page 962.



Liquid-Level Control for Evaporators

The liquid-level control illustrated is suitable for use with pipe coils, direct-expansion coolers, brine coolers and similar equipment. It is operated by a steel ball float riding in the liquid. The float operates a mercury contact switch controlling the current to a solenoid valve in the liquid-supply line leading to the control chamber. The supply line is opened only when the valve solenoid is energized. It is suitable for use with the various refrigerating liquids, such as anhydrous ammonia, sulphur dioxide, menthyl chloride, etc., and practically all types of refrigerating evaporators.

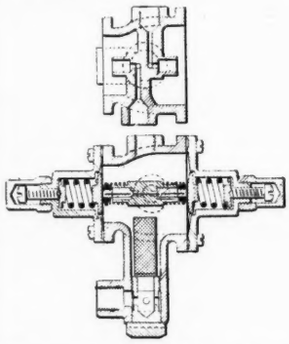
Grinnell Company, 260 West Exchange St., Providence, R. I. Jan. 13, 1931, page 81.

Duplex Pressure-Regulating Valve

The duplex pressure-regulating valve illustrated is suitable for oil and other liquids where it is desired to control the pressure accurately from 100 to 150 lb. pressure at capacities up to 90 gal. per hour.

Liquid enters the valve at the bottom, passing upward through a strainer. Pressure is exerted upon two diaphragms clamped between the body flanges. The larger diaphragm controls the pressure at which the liquid is discharged to the line. Pressure at which each diaphragm will open is regulated by adjustment of the side springs. The valve is made, in the smaller sizes, of aluminum, zinc, Monel metal and brass.

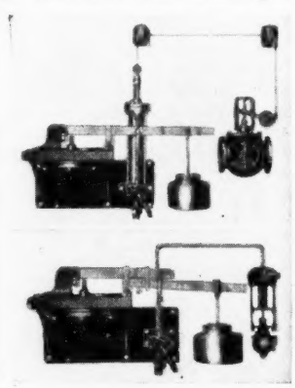
Monarch Manufacturing Works, Inc., 2730 East Westmoreland St., Philadelphia, Pa. June 24, page 1006.



Pressure Regulator for Steam, Liquids and Air

Two types of pressure regulators for use with practically any type of lever or diaphragm-operated regulating valve on steam, air, gas and oil lines have been made available. The regulator shown in the upper view is a single-lever unit equipped with an operating cylinder, Several valves may be controlled from one operating cylinder, or a number of cylinders may be used on a single control.

The one shown in the lower view is a double-lever unit for use on pressures from 40 to 250 b. It is fitted with a small pilot



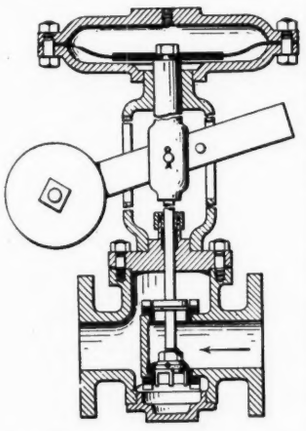
valve for controlling the pressure to the diaphragm chamber of the regulating valve. The complete control can be used as a reducing valve, pump or air compressor governor, or to control the flow of steam or liquid for practically any purpose.

Defender Automatic Regulator Company, St. Louis, Mo. Sept. 30, page 551.

Regulating Valve for Pressure and Vacuum Service

This balanced regulating valve is of the direct-acting pressure type, suitable for operating pressures up to 100 lb. When used for vacuum service the weight is used on the free end of the lever, and for pressure service it is changed to the pivoted end.

Of semi-steel construction with bronze seats and stem, the valve may be installed with the diaphragm above or below. Operating pressures range from inlet maximum 100 lb., outlet or reduced-pressure maximum 15



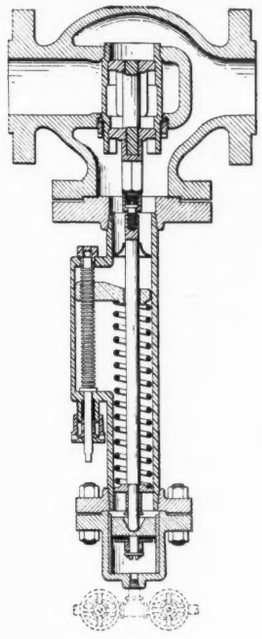
lb. gage, to minimum of 10 in. vacuum. The valve is available in standard pipe sizes from 1½ to 8 inches.

Strong, Carlisle & Hammond Company, 1392 West 3d St., Cleveland, Ohio. June 10, page 921.

Feed-Water Excess-Pressure Regulator

In this excess-pressure regulator, construction of the valve, which is fully balanced, tight-seating and readily removable, is similar to that furnished with the Bailey thermo-hydraulic feed-water regulator. In this valve the cage is made tight in the body by a sealing flange and a clamping nut, providing flexibility in the cage for differences in expansion or contraction and precluding the possibility of distortion of the valve seats.

Feed-water pressure is ap-

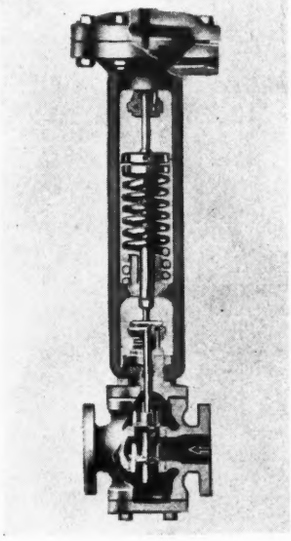


plied to the under side of the piston, which balances the steam pressure transmitted through the water seal surrounding the spring plus the pressure exerted by the spring itself. The amount of excess pressure in the feed-water line is regulated by adjusting the tension of the spring mounted on the side of the bonnet.

Bailey Meter Company, Cleveland, Ohio. March 4, page 372.

Excess-Pressure Pump Governor

In the governor illustrated the valve is opened by the boiler pressure, connected below a diaphragm and assisted by an adjustable spring. These two forces are opposed by the pump discharge or boiler feed-line pressure connected above the



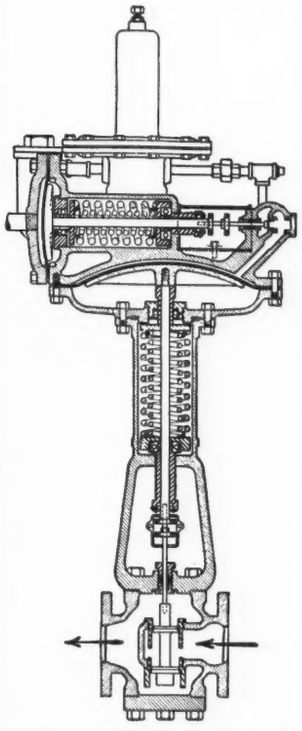
diaphragm. When the pump discharge pressure reaches the combined pressure of the boiler steam and the spring it closes the valve to a point where the steam supplied to the pump is sufficient to maintain the desired excess pressure on the feed line.

Governors with bronze or cast nickel-iron bodies suitable for pressures up to 200 lb. and with chrome-alloy cast-steel bodies for pump pressures of 300, 400 or 600 lb. are available. All governors are adjustable for excess pressures of from 10 to 60 pounds.

Neilan Company, Santa Fe Ave., Los Angeles, Calif. July 22, page 153.

Steam Regulator With Air-Operated Pilot Valve

Because the pilot valve of this regulator is operated by an external supply of air pressure



rather than by live steam pressure, as is the usual practice, it is said to give a constant steam pressure within exceptionally close limits regardless of variation of the inlet steam pressure.

The pilot valve is normally held open by compression springs. Operating air from an auxiliary reducing valve flows through the pilot valve to the main-valve diaphragm. This pressure overcomes the force of multiple springs, and the main valve opens, permitting high-pressure steam to flow through the valve. As this reduced-pressure side is connected to the pilot valve diaphragm, the pilot valve closes and shuts off the operating air when the reduced pressure reaches the desired point.

Both the pilot and main diaphragm plungers and valve stems float freely in ball bearings, and the adjusting screws also work against ball bearings. The regulator may be operated on any air pressure between 15 and 150 lb. Sizes available range from ½ to 16 in., suitable for pressures up to 600 pounds.

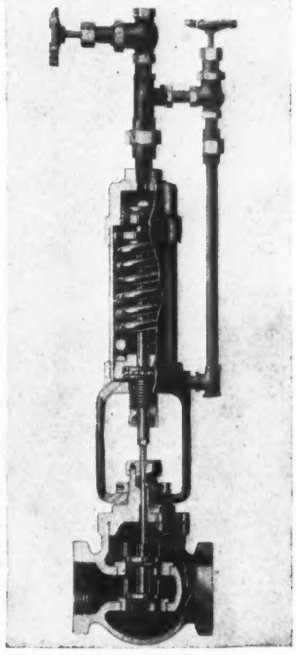
Neilan Company, 641 Santa Fe Ave., Los Angeles, Calif. Jan. 27, 1931, page 161.

Ball-Bearing Piston-Type Pump Governor

Improved design of valve and ball bearing guides at two points on the valve stem are incorporated in the Neilan No. 200 piston-type pump governor. The guides are integral with the seat ring instead of being on the disk, as is the usual practice. This design tends to reduce wire-drawing to a minimum and to increase the capacity by reducing the flow turbulence. The valve is closed by the line pressure connected above the piston.

All governors are regularly supplied equipped with valve plugs and seat rings milled from solid Monel metal bar stock, but bronze or stainless steel may be had. Sizes up to 2 in. have bodies of hard bronze with screwed ends, and cast nickel-iron bodies with flanged ends are furnished in 2 in. and larger. Sizes from ½ to 4 in. are also available.

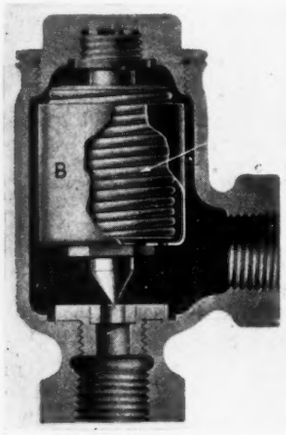
Neilan Company, 641 Santa Fe Ave., Los Angeles, Calif. July 1, page 36.



Steam Traps

Improved Bellows-Type Trap

Improvements in this No. 9 steam trap over previous models include longer bellows, protective shielding and a self-centering valve head. Four corruga-

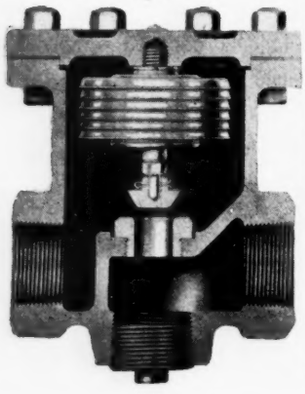


tions have been added to the bellows' helical tubing, distributing the movement of the bellows over a total of fourteen corrugations. The thermo-sensitive element is incased by a heavy brass shield. Self-centering of the valve has been accomplished by providing greater flexibility in the bellows. Valve head and seat are made of Monel metal.

Sarco Company, Inc., 183 Madison Ave., New York City. May 20, page 799.

Bellows-Type Industrial Steam Trap

Quick opening and closing without wire-drawing characterizes this bellows-type trap designed for use with heating systems and all process-steam applications in the pressure range from 0 to 100 pounds.



The actuating element consists of a large-diameter bellows suspended from the cover and carrying the valve disk on the lower side. The pressure on the inside and outside of the bellows remains constant for any steam pressure, and the trap will operate without adjustment on any pressure from 0 to 100 pounds.

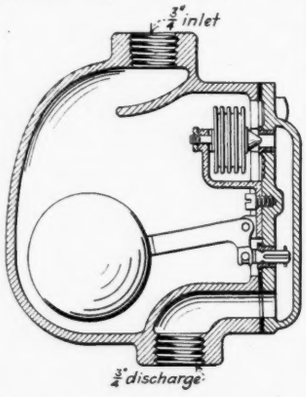
It can be used either as an angle or straight-through trap by changing the pipe plug from the bottom connection to the side, and vice versa.

Capacities in pounds per hour range from 545 lb. at 0 lb. pressure to 7,720 lb. at 100 lb. pressure for the ½-in. trap, and from 4,970 lb. to 70,500 at corresponding pressures for the 2-in. size.

W. H. Nicholson Company, Wilkes-Barre, Pa. Oct. 28, page 701.

Blast Trap for Unit Heaters

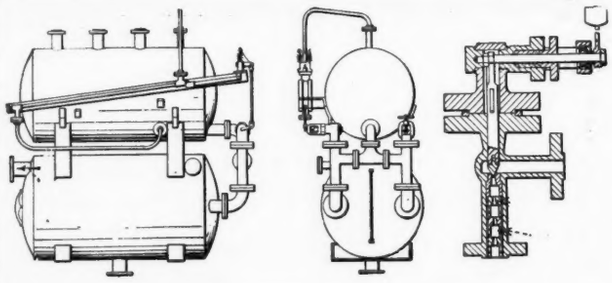
Designed especially for unit heaters of the smaller sizes and for draining hot blast coils and



similar apparatus, this trap has a thermostatic element mounted in the upper part of the body for discharging the air, and a float-operated valve for the condensation.

The valve, valve body and link are of steam brass; the float is of seamless copper; and the thermostatic element is a standard multiflex bellows. Capacities of the trap range from 200 lb. an hour at ¼ lb. pressure to 800 lb. an hour at 5 lb. pressure. All operating parts of the trap are readily accessible by removing the front cover.

Bishop & Babcock Sales Company, 4910 Hamilton Ave., N.E., Cleveland, Ohio. March 25, page 490.



Drain Control for High-Pressure Steam Mains

This drain control is designed to give continuous and automatic draining of high-pressure steam lines without the use of traps or other auxiliary equipment. A high-pressure and low-pressure receiver with two control valves interposed between them, one valve being manually controlled and the other controlled by a thermostat constitute the unit.

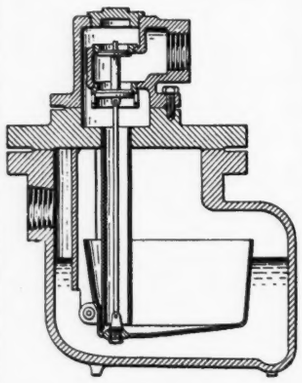
Drips from the high-pressure steam lines are led to the high-pressure receiver, expanded to a lower pressure through special expansion control valves and collected in the low-pressure receiver. From this receiver the condensate is pumped or discharged to a heater, hotwell or other convenient point.

In operation the manually controlled valve is set to take care of the minimum flow, and the fluctuations are handled by the thermostatically controlled valve. The drain control is built for three pressures, 250, 400 and 600 pounds.

Elliott Company, Jeanette, Pa. Oct. 21, page 665.

Balanced-Valve Trap Has Large Capacity

Unusually large capacity at ow pressure is one of the claims made for the Strong balanced-



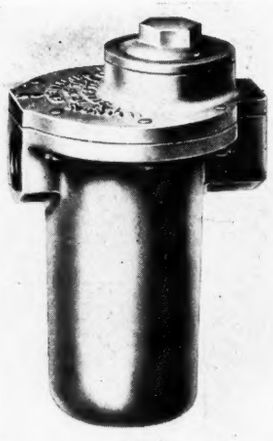
valve trap. A double-seated valve is operated by an open bucket hinged on a bracket extending downward from the cover. For special application the trap is fitted with valve, bucket and other operating parts of material suitable for the conditions involved.

Sizes are from 2½ to 3½ in., inclusive; operating pressures range from 0 to 50 lb.; and the capacities up to 100,000 lb. of liquid an hour.

Strong, Carlisle & Hammond Company, Cleveland, Ohio. April 29, page 686.

Blast Trap for Unit Ventilators and Heaters

In the Series 17 trap a bucket-operated valve handles the condensation, and a thermostatically



controlled air-vent bypass is incorporated in the cover.

The bucket, with valve stem attached, is carried from a long guiding sleeve arranged to move vertically in a central discharge tube, the mechanism being designed to give positive snap action and eliminate wire-drawing. The air-venting element is mounted in a circular chamber on the body cover. Removal of this core gives access to both the water-valve and air-valve seat for inspection or replacement.

Furnished in ¾-in. pipe size, with capacities ranging from 150 lb. of hot condensate an hour at 1 lb. pressure to 500 lb. at 10 lb. pressure, it has an overall height of 6½ in., an inlet-to-outlet measurement of 4½ in., and a total weight of less than 5 pounds.

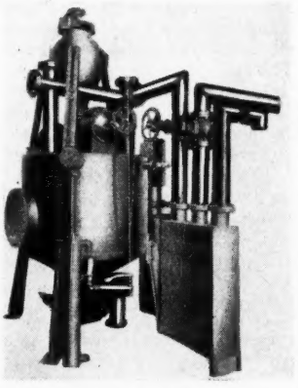
Illinois Engineering Company, Chicago, Ill. June 10, page 922.

Welding Machines and Accessories

Non-Automatic Acetylene Generators

Type NA3 generator is intended for plants using low-pressure welding and cutting apparatus, and it delivers to a storage holder which is weighted to supply acetylene to the piping system at a pressure of 20 in. water column.

From the generator the gas enters a wash box, where it passes through a water seal which acts as a scrubber to remove any particles or residue. The gas holder, of suitable size, may be placed either inside or outside the generator house. The generator is classed as non-automatic, the carbide feed not



being automatically governed by, or interlocked with, the immediate acetylene requirements.

Type BA4 generator is similar to type NA3, with the addition of an automatic booster system to deliver acetylene to the shop piping system at pressures not to exceed 15 pounds.

Oxweld Acetylene Company, 30 East 42d St., New York City. Aug. 19, page 303.

High-Capacity Gas-Engine-Driven Welder

In this arc-welding machine designed especially for field work the generator, which is of the variable-voltage single-operator type, is rated at 400 amp., with a current range up to 500 amperes.

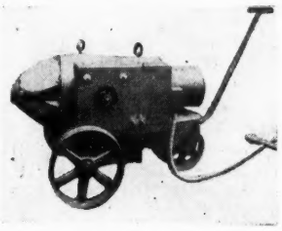
It is driven by a six-cylinder engine with rating of 33.75 hp. Automatic throttle control permits the engine to idle at about half speed when the arc is not going. When the arc is struck the engine immediately comes up to full speed. A time delay keeps the engine going at full speed when the arc is momentarily broken. This permits the operator to change electrodes, etc., without affecting the speed.

Lincoln Electric Company, Cleveland, Ohio. Sept. 30, page 551.

New Welder Eliminates Explosive Arcs

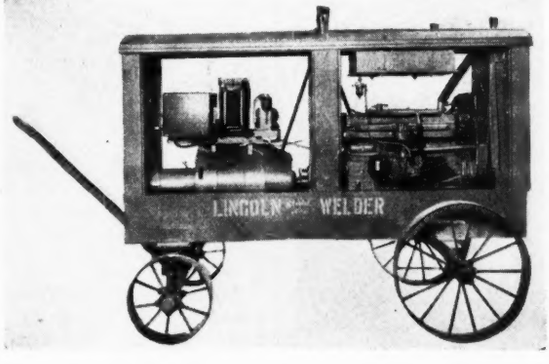
By the use of a special piece of apparatus, known as a "flex-actor," as applied to this machine, it is much easier for the operator to strike and maintain the arc, and explosive characteristics are eliminated. The "flex-actor" prevents the overshooting or abnormal rise of current and resultant tendency of the electrode to stick. In addition, it corrects for lengthening of the arc.

Extraordinary arc stability and flexibility, over the entire current range, both at extreme low- and high-current values,



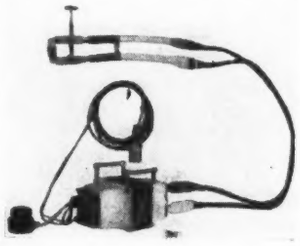
are claimed for this welder. Other features of the machine are drip-proof compact construction, mobility, single rheostat adjustment and high overall efficiency.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. March 25, page 488.



Electric Brazing Equipment

Electric brazing equipment consisting of a transformer, foot switch and tongs is illustrated. Typical equipment involves a 5-kva. transformer weighing 45 lb. and having a 220-volt prim-



ary and an 8-volt secondary. A 10-kva. transformer unit for heavier duty having the same primary taps and 8-, 10- and 12-volt taps on the secondary is also available.

General Electric Company, Schenectady, N. Y. Sept. 30, page 552.

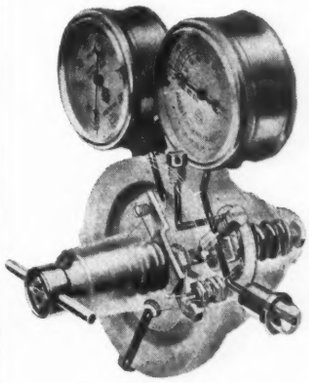
Welding Electrode for Stainless Steels

Developed especially for welding stainless steel, this new electrode, designated Stainweld A, is said to give welds of the same chemical content as the stainless steel itself. The rod is coated with a material which in the heat of welding forms a gaseous envelope around the arc. It is used with reversed polarity and permits of making a weld that is said to be as impervious to corrosion as the metal it joins. It is obtainable in three sizes, $\frac{1}{8}$, $\frac{5}{32}$ and $\frac{3}{16}$ in. of standard 14-in. lengths, and can be used for horizontal, vertical or overhead welding.

Lincoln Electric Company, Cleveland, Ohio. June 3, page 886.

Multi-Stage Regulator for Welding Gases

To maintain the pressure and volume of welding gases under constant control is the purpose of this multi-stage pressure regulator. Two separate regulators placed in one body are connected so that the reduced pressure on the body of the first-stage regulator passes directly to the second stage, but when the tank pressure is reduced to



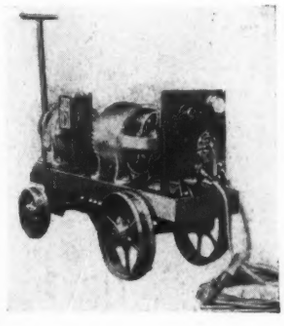
below 200 lb. the first stage is cut out automatically and the tank pressure is passed directly to the second stage. Screens are installed to remove any foreign matter, and a dual system of vents is provided.

Weldit Acetylene Company, 636 Bagley Ave., Detroit, Mich. April 8, page 565.

100-Amp. Welder for General Repair Work

Designed especially for small jobs and repair work in general, this 100-amp. welder is available with three types of drives: electric motor, gasoline-engine and belt drive.

The unit has a rating of one hour at full load without more than a 50 deg. C. temperature rise, and has a welding range of 30 to 125 amp. It is relatively



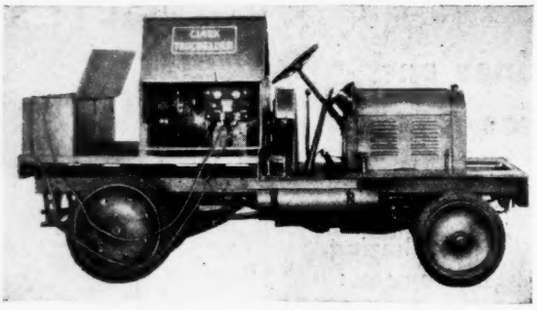
light in weight and suitable for operation in limited space.

Wilson Welder & Metals Company, Inc., Hoboken, N. J. June 10, page 922.

Portable Electric Arc-Welding Unit

Arc-welding current ranging from 60 to 250 amp. at 25 volts is produced by this unit, consisting of a self-excited, arc-welding generator, with control, driven by a special heavy-duty, 4-cylinder gas engine developing 20 hp. at 1,480 r.p.m. Currents between 25 and 60 amp. may also be obtained by inserting in the circuit a current-reducing resistor.

Automatic stabilizing of the



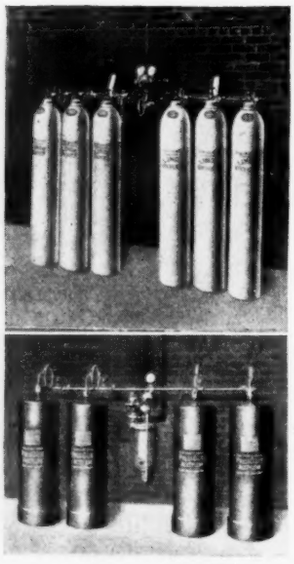
welding arc is provided by a self-adjusting reactor. For striking the arc a high open-circuit voltage of 65 volts is available, after which the voltage is automatically reduced to that required to maintain the arc. Adjustments in the range of welding current from 60 to 250 amp. are made by simply shifting the generator brushes by means of an external handle.

Clark-Tructractor Company, Battle Creek, Mich. Sept. 30, page 552.

Oxygen and Acetylene Manifolds

This six-cylinder oxygen manifold is of the wall type and is arranged so that three cylinders may be changed while the bank of three on the other side is maintaining the supply of oxygen.

The four-cylinder acetylene manifold shown is also of the



wall type. Each cylinder lead has a valve in the header, so that each cylinder is independent of the others. This makes it possible to use either one, two, three or four cylinders at the same time, so that a cylinder may be readily replaced.

Oxweld Acetylene Company, 30 East 42d St., New York City. Sept. 9, page 435.

High-Capacity Electric Welder

With a rating of 600 amp. this electric welder may be had in either the portable truck type or stationary truck type. It is a motor-driven, single-operator, variable-voltage machine and has a current range of from 180 to 750 amp. The working mechanism of all controls is contained in a ventilated inclosed steel cabinet, with hand regulators and switches mounted on a panel that forms a side of the cabinet. This unified control increases the simplicity of the operation of the welder. The face of the volt-ammeter is mounted flush with the control panel, assuring protection against damage.

Lincoln Electric Company, Cleveland, Ohio. Aug. 19, page 304.

Hardenable Copper Alloy

"Tempaloy" is the name given to a hardenable copper alloy having a composition of 95 per cent copper, 4 per cent nickel and 1 per cent silicon. When heated to 750 to 800 deg. C., the nickel silicide goes into solid solution, and if chilled from this temperature the alloy is soft and ductile. When heat-treated at approximately 450 deg. C. for several hours the nickel silicide is precipitated and the material becomes hard and strong, resembling mild steel in its physical properties.

Addition of aluminum to this alloy strengthens it considerably and accentuates the hardening properties.

American Brass Company, Waterbury, Conn. March 18, page 450.

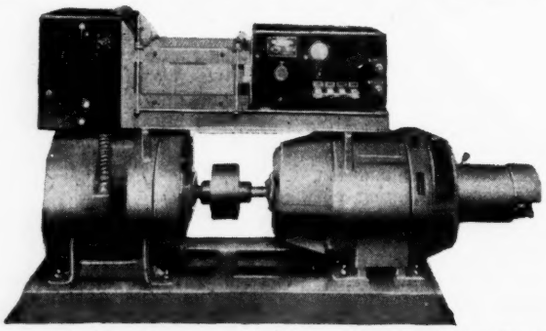
New Welding Electrodes

Reduced metal spattering and a quiet, stable and flexible arc at both extreme low- and high-current values are claimed for the "Flex-Arc" welding electrode. These electrodes have a uniform melting rate which assures quick penetration, and the welds are easily machined and are free from slag, oxidation and gas inclusions. Tensile strengths ranging from 55,000 to 60,000 lb. per square inch are obtained.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. Oct. 7, page 590.

Atomic Hydrogen Welding Machine

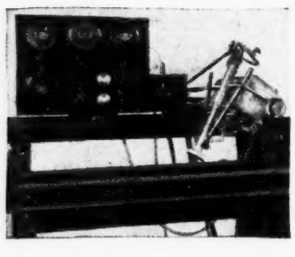
The application of atomic hydrogen welding has been expanded by the development of



this automatic welder for longitudinal seam-welding of all kinds. It consists of a clamping mechanism for holding the work, an automatic travel carriage, a welding head and the usual control devices. In addition there is an auxiliary feeding device for feeding filler rod into the arc.

When power is applied to the machine a valve is opened simultaneously supplying hydrogen to the arc. The striking of the arc, movement of the travel carriage and length of the arc are all controlled automatically. Alloys containing chromium, aluminum, silicon or manganese can be welded without fluxes and without surface oxidation.

General Electric Company, Schenectady, N. Y. Oct. 21, page 664.



Improved Welding Blowpipe

The inner cone of the flame produced by the W-7 torch is somewhat different from that usually obtained. It is shorter and thicker and has a tendency to assume the shape of a ball at the end. This tends to speed up the rate of welding, because a large portion of the high-temperature flame surface is brought closer to the metal. The tip and welding head are of one-piece construction, being combined in a long and slender stem of the goose-neck type. The low-pressure injector principle is employed, with improved design of injector and mixing chamber.

Oxweld Acetylene Company, New York City. March 18, page 450.

Phos-Copper Welding Alloys

Developed for use as a general welding and brazing material for copper and copper-base alloys, an alloy known as "Phos-Copper" is marketed in rod and strip form and is composed, essentially, of copper and from 5 to 10 per cent phosphorus. The alloy begins to melt at approximately 700 deg. C. (1,292 deg. F.) and becomes fluid at 750 deg. C. (1,382 deg. F.) for the rod and 800 deg. C. (1,472 deg. F.) for the strip form. The presence of the phosphorus prevents the oxidation of both the copper and the surfaces being joined, thereby acting as a flux. Tensile strength of the deposit or joint varies from 18,000 to 30,000 lb. per square inch, and is greater than that of copper, but its ductility is less than that of copper.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. Aug. 5, page 230.

Electrode for Thin Metal

"Lightweld" welding electrode can be used on 16-, 18-, 20- or 22-gage metal in making a lap, butt or corner weld, and is said to give a dense weld free from pin holes. It was designed to be used with a manual carbon arc and with from 30 to 60 amp. direct current, and is suitable for horizontal, vertical or overhead work. The size of the rod is $\frac{1}{16}$ in. diameter and 30 in. long.

Lincoln Electric Company, Cleveland, Ohio. June 24, page 1006.

Metallic Electrode Holder

Two sizes of the Wachs metallic electrode holder are available. One is for electrodes from $\frac{1}{16}$ to $\frac{1}{4}$ in. in diameter, with current-carrying capacity up to 400 amp., and the other is for electrodes from $\frac{1}{4}$ to $\frac{1}{2}$ in., inclusive, with capacities from 400 to 800 amperes.

A simple compression lever makes the grip on the electrode

in place of the usual spring. The gripping surfaces are smooth and free from corrugations. The electrode can be held at any desired angle.

Northwestern Manufacturing Company, Milwaukee, Wis. June 3, page 886.

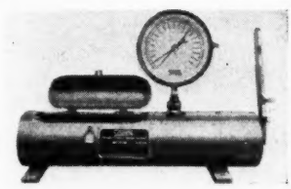
Steel Welding Rod

Oxweld No. 22 S.D. welding rod is self-fluxing and deoxidizing and forms a fusible slag that rises to the surface, where it serves as a protective coating which, although extremely thin, protects the surface of the molten bath from the oxygen of the air and thus prevents oxidation. It has the ability to fuse easily into the base metal at both the sides and the bottom of the Vee.

Oxweld Acetylene Company, New York City. April 8, page 566.

Portable Machine for Testing Welds

Designed to facilitate testing of welds in the field or shop, this portable tensile-testing machine consists of a tubular com-



pression member with a set of grips in the head and a hydraulic cylinder block in its base. The cylinder block contains a communicating pump and cylinder directly machined into a single block, and the cylinder pressure operates a piston carrying a second set of grips.

The welded specimen to be tested is placed between the jaws, which have spring grips. Pressure is applied by operating the pump, the load being measured directly in pounds per square inch by a gage actuated by the pressure in the cylinder.

Oxweld Acetylene Company, New York City. Dec. 23, page 1024.

Gasoline-Oxygen Cutting Torch Unit

Instead of the usual acetylene storage tank placed alongside the oxygen cylinder, a 2-gal. gasoline tank is mounted at the rear of the oxygen tank in this cutting torch unit, giving considerable reduction in weight and requiring a much smaller truck.

The new unit consists of cutting torch with four gasoline cutting tips, 25 ft. of high-pressure oxygen hose, 25 ft. of flexible metallic gasoline hose, a 2-gal. gasoline tank, a high-pressure regulator and other auxiliaries.

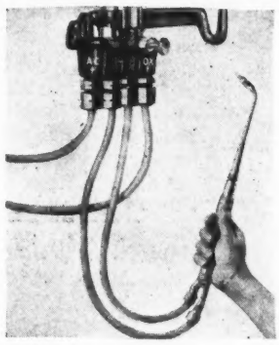
Torchweld Equipment Company, Chicago, Ill. Jan. 13, 1931, page 82.

Welding Rod for Mild-Steel Plates and Castings

Among claims made for the Weldite C-No. 6 fluxed rod designed for carbon-arc welding are that the welding speed has been substantially increased and the deposit is strong and ductile, being more readily machinable than deposits made with the usual filler rod used with the carbon-arc process.

Ease of manipulating the arc, due to the influence of the flux coasting, which causes the arc to pull from the hottest part of the weld puddle rather than jump to the colder edges, enables the operator to attain welding speeds considerably higher than is possible with ordinary bare filler rod. The rod is particularly adaptable to heavy-section welding of mild steel.

Fusion Welding Corporation, 10257 Torrence Ave., Chicago, Ill. April 1, page 529.



Automatic-Shut-Off for Welding Gases

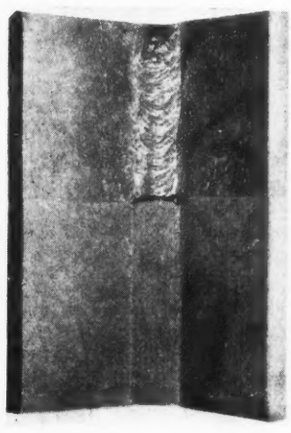
By the use of this shut-off for welding gases, known as the Rego "Economizer," no gas is burned while the operator is setting up the work, and none is wasted while he is readjusting the flame. A neutral flame is obtained as soon as the welding torch is lifted from the torch arm. Both shut-off valves in the unit are of the diaphragm type. A simple wall bracket may be supplied for holding the economizer and the various tips.

Bastian - Blessing Company, 240 East Ontario St., Chicago, Ill. Feb. 18, page 266.

Putty to Improve Appearance of Welded Joints

To improve the appearance of welded joints, particularly on machinery with welded frames, bedplates and other parts, is a function of Weldite fillet putty, which is readily applied to weld beads in any type of joints or position and which will not loosen from shock or vibration. It is furnished in a powder form to be mixed as desired from paste to a consistency thin enough to be applied with a brush. The illustration shows a typical joint before and after applying a coat of the putty.

Fusion Welding Corporation, 10257 Torrence Ave., Chicago, Ill. Aug. 19, page 304.



New Hard-Surfacing Rod

Production of surfaces of almost pure tungsten carbide by hard-surfacing is made possible by the use of this welding rod known as "Borod." It consists of a mixture of unsmelted alloy materials mixed with a suitable binder and held within a soft-steel sheath.

When the rod is exposed to the heat of the welding arc or gas flame the sheath melts down and carries with it the alloy content, consisting of metallic tungsten, carbon and other materials.

Stoody Company, Whittier, Calif. March 18, page 450.

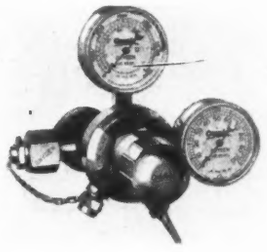
Arc-Welding Wire for General Welding

Wilson red-processed arc-welding wire is said to combine a fast and smooth-flowing quality with good penetration. It will produce a weld of at least 50,000 lb. per square inch tensile strength, and is especially recommended for general welding operations where medium ductility is required.

Wilson Welder & Metals Company, Inc., Hoboken, N. J. Sept. 23, page 514.

Two-Stage Oxygen Regulator

A constant line pressure free from fluctuation is obtained by this type R-43 oxygen welding



regulator, the reduction in pressure being accomplished through two separate and independent sets of diaphragms, valves and springs. The full cylinder pressure of 2,000 lb. is reduced in the first stage to less than 250 lb. per square inch. The final pressure is regulated by the operator by means of an adjusting screw, and any operating pressure may be obtained.

Instead of the usual handle-type pressure-adjusting screw, a screw with a ribbed cap has been used. This change in design precludes the possibility of breakage, as there are no projections on the handle.

Oxweld Acetylene Company, New York City. Oct. 7, page 589.

NEWS of the FIELD

Discuss Timely Power Topics at Fuels Meeting And Power Conference in Chicago This Week

Papers on economics, prime movers, fuels, combustion, furnaces and electrical developments to be presented

THIS WEEK Chicago will be the scene of the most significant group of meetings in years, bearing on the problems of the power field. The Fifth Midwest Power Engineering Conference will be in session from Feb. 10 to 12, inclusive; the Fourth National Fuels Meeting of the American Society of Mechanical Engineers will convene on the 11th and continue through 13th; and for five days, from the 10th to 14th, inclusive, the power show will hold forth at the Coliseum. Headquarters for both meetings will be the Stevens Hotel.

At the six sessions and two luncheon meetings of the power conference various phases of the power field of current interest to the nine participating societies are to be broadly discussed. Economies, investment, high-temperature metals, prime movers and late developments in the electrical field are some of the general topics to be considered. Full sessions will be devoted to refrigeration and ventilation, feed-water problems of the power plant, and to subjects of civil engineering interest, including salient features of the proposed Chicago subway system.

An outstanding feature of entertainment will be the banquet and ball, a joint function of the two participating bodies, for which an elaborate program has been prepared. Immediately following the dinner some of the wonders of electronic application will be demonstrated.

Sponsors and endorsers of the conference are the local or regional divisions of the following societies: A.S.M.E., A.I.E.E., N.E.L.A., A.S.R.E., A.S.H.V.E., A.I.M. & M.E., A.S.C.E., Western Society of Engineers, and the National Safety Council. Two representatives from each of these societies make up the general conference committee. The executive officers are: H. W. Fuller, president; G. E. Pfisterer, secretary; K. A. Auty, treasurer; Thomas Wilson, chairman of the program committee. Indicating the representative character of the conference, the six vice-presidents serving with the committee are C. C. Whittier, Chicago; W. M. White, Milwaukee; Charles S. Gladden, Detroit; Paul Doty, St. Paul; John Hunter, St. Louis; and Prof. A. C. Willard, Urbana, Illinois.

Sponsored by the Fuels Division of the A.S.M.E., the National Fuels Meeting is to have a program of outstanding interest that has been so coordinated with the schedule of the power conference that there will be a minimum of interference. This year a definite effort has been made to frame a program devoted to specific subjects, such as the economics of fuel utilization, use of refinery waste fuels, new processes of dehydrating low-grade coals, slag-tap furnaces, developments in pulverized fuel firing, selection of steam generating equipment, and other subjects of like interest. Entire sessions are to be given over to the small stoker, smoke abatement and the fly-ash problem.

The executive committee responsible for arranging the meeting are the officers of the Fuels Division of the society, of which Professor Walter J. Wohlenberg is chairman, and A. D. Blake, secretary. A. E. Grunert, of Chicago, has served as chairman of the program committee.

Programs for the two meetings are:

FIFTH MIDWEST POWER ENGINEERING CONFERENCE

TUESDAY, FEB. 10

9:00 A.M.—Registration, Stevens Hotel.
12:00 Noon—Luncheon, Pres. H. W. Fuller presiding. "Power in a Century of Progress," Major Lenox R. Lohr, manager Chicago World's Fair Centennial Celebration.
2:15 P.M.—Power Economies—Chairman, C. F. Hirshfeld. "Balancing Plant Investment with Operating Cost," A. H. Kehoe; "Advance in Electrical Distribution," H. W. Eales; "Dual Purpose Power Plants and Commercial Distribution of High-Pressure Steam," John M. Drabelle.
8:00 P.M.—Refrigeration and Ventilation—Chairman, Alvin Baer. "New Application of Refrigeration in Air Conditioning," Willis H. Carrier; "The Future of Central Station Refrigeration," George Horne.

WEDNESDAY, FEB. 11

9:30 A.M.—Prime Movers—Chairman, Alex D. Bailey. "Trends in Steam Turbine Development," Prof. A. G. Christie; "Reciprocating Engines for the Higher Steam Pressures," John F. Ferguson; "The Influence of Use on the Design of Internal Combustion Engines," H. F. Shepherd; "Water Turbines of the Propeller Type," L. F. Harza.
12:00 Noon—Luncheon—Chairman, C. C. Whittier. "High-Temperature Metals for the Power Plant," L. W. Spring.
2:15 P.M.—Late Electrical Development—Chairman, R. F. Schuchardt. Power Requirements for the Pumping of Oil, Gas and Gasoline, Audley E. Harnsberger; "Arc Welding in the Power Plant," W. H. Zorn; "High Voltage D. C. Transmission," C. W. Stone.

THURSDAY, FEB. 12

10:00 A.M.—Water Problems of the Power Plant—Chairman, Prof. F. G. Straub. "Late Developments in Pretreatment of Boiler Feed Water," S. T. Powell; "Developments in Evaporator Practice and Design," F. S. Collings. "Concentration Control of Boiler Water, H. S. Whiton.
12:00 Noon—Luncheon—See Fuels Meeting program.
2:15 P.M.—Civil Engineering—Chairman, Maj. R. W. Putnam. "Geology and Reservoir Power Plants," Dr. M. M. Leighton; "Engineering Features of the Chicago Subway," Major R. F. Kelker and Robert Ridgway.
7:00 P.M.—Banquet and Ball—Speaker, O. H. Caldwell. Demonstrations by Westinghouse Electric & Manufacturing Company. Entertainment, "The Pageant of Power."

FOURTH NATIONAL FUELS MEETING

WEDNESDAY, FEB. 11

2:15 P.M.—Chairman, A. E. Grunert. "Use of Refinery Waste Fuels in Modern Steam Plants," H. J. Klotz; "Economics of Fuel Utilization," A. L. Brown; "New Processes of Dehydrating Low-Grade Coal," Max Toltz.
8:00 P.M.—Chairman, E. L. Beckwith. "Symposium on Small Stokers," T. A. Marsh; "Conversion of Coal-Fired Boilers and Furnaces to Gas Firing," W. D. Edwards. "Utilization of Anthracite Coal," C. A. Connell.

THURSDAY, FEB. 12

10:00 A.M.—Chairman—John Van Brunt. "Slag-Tap Furnaces," A. L. Baker; "Developments in Pulverized Fuel Firing," H. Kreisinger; "Accuracy Obtainable in Coal Weighing, Sampling and Analyzing," F. W. Martin.
12:00 Noon—Luncheon—Chairman, W. Trinks. "Recent Developments in By-products from Bituminous Coal," A. C. Fieldner.
2:15 P.M.—Chairman, Prof. G. F. Gebhardt. "Effect of Fineness of Pulverization on Boiler Efficiencies," E. H. Tenney; "Radiation in Boiler Furnaces," N. Artsay; "Reduction of Unaccounted-For Losses in Boiler Tests," W. F. Davidson.

FRIDAY, FEBRUARY 13

10:00 A.M.—Chairman, Dean A. A. Potter. "Selection of Steam-Generating Equip-

Volume 72 Index

covering the last half of 1930, is now available for distribution and will be mailed to any *Power* reader on request. Those who wish to be placed on the permanent list to receive the index regularly as issued should indicate this in their requests.

ment," F. H. Rosencrantz; "The Boiler Room of the Future," G. A. Orrok; "Improvements in Missouri-Kansas Coals and Their Burning Equipment," Edward L. McDonald.

2:00 P.M.—Chairman, John Hunter. "Developments in Smoke-Abatement in Europe and America," Ely C. Hutchinson; "Smoke-Abatement Enforcement," Col. E. H. Whitlock; "Effects of Atmospheric Pollution," H. B. Meller; "General Industrial Smoke Abatement," Victor J. Azbe; "The Fly Ash Problem," H. H. Bubar; "Smoke Surveys," Osborn Monnett.

Water Power Output Gains in December

FOR THE FIRST TIME since April the average daily production of electricity by the use of water power was larger than in the preceding month, the United State Geological Survey reports in the December statement on production of electric power made public Feb. 3. In December the average production of hydro-electric power was nearly 4 per cent greater than in November, which indicates some improvement in drought conditions, it is stated.

Average daily production of electricity by all public-utility power plants in the United States, producing 10,000 kw.-hr. or more per month, was 260,300,000 kw.-hr. in December, nearly 2 per cent greater than the daily output in November. The normal change in the daily production from November to December is an increase of about 1 per cent, according to the report.

The total amount of electricity generated for public use in the United States during 1930 was 95,638,000,000 kw.-hr., approximately 2 per cent less than the 97,352,000,000 kw.-hr. generated in 1929.

Midwest Engineering Exposition Opens at Coliseum in Chicago This Week

Features include much new equipment, continuous boiler test and story of refractories in motion pictures

MORE THAN 200 LEADING MANUFACTURERS of power machinery and equipment will be represented at the Midwest Engineering Exposition, which runs from Feb. 10 to 14 at the Coliseum in Chicago, in conjunction with the Fifth Midwest Power Engineering Conference and the Fourth National Fuels Meeting. The display will give a complete cross-section of late equipment developments in the power field. Exhibits of heating, ventilating and refrigerating equipment will be larger than usual. Fuel-oil burners, refractories and chemicals will be on display, and a number of the exhibitors will demonstrate methods of operation with actual working models.

An educational feature unique to power shows will be the continuous testing of a stoker-fired boiler fully equipped with instruments and a smoke observer in the stack. A 700-sq.ft. low-pressure boiler served by an overfeed stoker and a 20-in., 75-ft. stack rising through the roof of the Coliseum will be given daily tests in burning different coals from representative fields in Illinois and Indiana. Steam at 5-lb. pressure will be generated and delivered into the heating system of the Coliseum. The tests are to be conducted officially by a well-known testing and engineering company of Chicago.

Representative exhibits will depict the latest developments in furnace refractories, water walls, boiler settings, stokers, pulverizers, coal- and ash-handling systems, induced-draft fans, automatic combustion systems, indicating and recording pyrometers, temperature controllers and regulators. One manufacturer plans to show a working exhibit of a stoker designed according to an entirely new principle; another will introduce a new 14-in. chain-grate stoker; several manufacturers will have working models of their stokers on display; a new small stoker will make its début; two newly designed pulverizers and one new burner will be exhibited; and a complete working model of a well-known pulverizer will be in operation. In addition a recently completed 5,000-ft. motion picture will be shown which depicts every step in the modern production of refractories from the mining of raw materials to the shipping of the finished product.

The modern trends in boiler design will be featured in some particularly interesting exhibits. Besides the continuous boiler test already mentioned, there will be a reduced model of one of the 1,400-lb. semi-vertical boilers complete with superheaters that are now being installed in the Ford Motor Company's Fordson plant. Another manufacturer will show a small electrically operated boiler with a water-softening system. Many unusual photographs and sectional drawings of recent boiler installations will be on display together with samples of welded drum construction. There will also be presented a demonstration of pressure control in the boiler feed line. In addition a full-sized section of a superheater, heat exchanger, steam-jet air pump and evaporator will be shown.

Steam specialties will be exceptionally well represented. Several manufacturers will show new valves, traps, separators and water-level controls. A number of high-pressure expansion joints, water columns, valves and other specialties will be on display, and a new line of lubricated plug valves will be shown.

Increased interest in accurate records and efficient operation is reflected in the greater numbers of recording and indicating instruments that will be exhibited together with the many automatic control devices. A large number of bearings, gears, speed reducers and power transmission appliances will be featured. Generators, motors, switches and other electrical equipment will be on display, along with diesel engine-generator sets. Rounding out the show will be a full quota of metals, tools and metal-working equipment along with many supplies and accessories.

▼ ▼ ▼

STRONGLY ADVISING SMOKE ABATEMENT

The new advisory board of the recently established Department of Smoke Abatement of Hudson County, N. J., left to right: Col. Elliott H. Whitlock, professor of mechanical engineering in charge of smoke-abatement research at Stevens Institute of Technology; Roy V. Wright, president of the American Society of Mechanical Engineers, and Dr. Harvey N. Davis, chairman, president of Stevens Institute of Technology

Research, Air Pollution and Electric Heating Discussed at A.S.H.V.E. Annual Meeting

TWENTY-TWO TIMELY TECHNICAL PAPERS were presented at the six sessions of the American Society of Heating & Ventilating Engineers' annual meeting in Pittsburgh, Pa., from Jan. 26 to 29. In addition to a full program, the meeting offered an opportunity to the members to inspect the society's research laboratory at the United States Bureau of Mines. Five of the technical sessions were held at the William Penn Hotel and one at the United States Bureau of Mines.

At the opening session the tellers reported the election of W. H. Carrier as president of the society for 1931. Other officers elected were F. B. Rowley, vice-president; W. T. Jones, second vice-president; and F. D. Mensing, treasurer. D. S. Boyden, E. K. Campbell, E. O. Eastwood, Roswell Farnham and E. Halt Gurney were elected to the council for a term of three years.

Among the papers presented at this session was a code for testing and rating concealed type of gravity radiation. After a very considerable amount of discussion, this code was adopted in part. The progress of heating and ventilating during the past quarter century, and during 1930, was depicted by R. P. Bolton and S. R. Lewis.

At the Tuesday morning session noise in ventilating systems was the main subject of discussion. Three papers were presented, which discussed this subject from various angles. Methods of reducing noice in ventilating units was the subject of a paper by Warren Ewald, and data concerning the absorption of noise in ventilating ducts were presented in a paper by G. L. Larson and R. F. Norris.

Air conditioning was the subject of the Tuesday afternoon session. Air conditioning in a bakery, for railway cars, and its effect on furniture, fixtures, and interior woodwork were discussed in the three papers.

The Wednesday morning session was held at the United Sates Bureau of Mines, and the first two papers presented were reports of research work undertaken at the society's research laboratory. One paper reported the air leakages through various forms of building construction, and the other paper dealt with the capacity of return mains from steam and vapor heating systems. This latter research completes the original program in pipe sizing, upon which the society embarked in 1922. A paper on welded piping for building heating systems, by F. G. Outcalt, brought forth considerable discussion which centered largely on the relative cost of welded and standard methods of pipe construction. The discussion indicated that welding was cheaper in the larger size pipe, but that standard screw fittings were cheaper for smaller sizes.

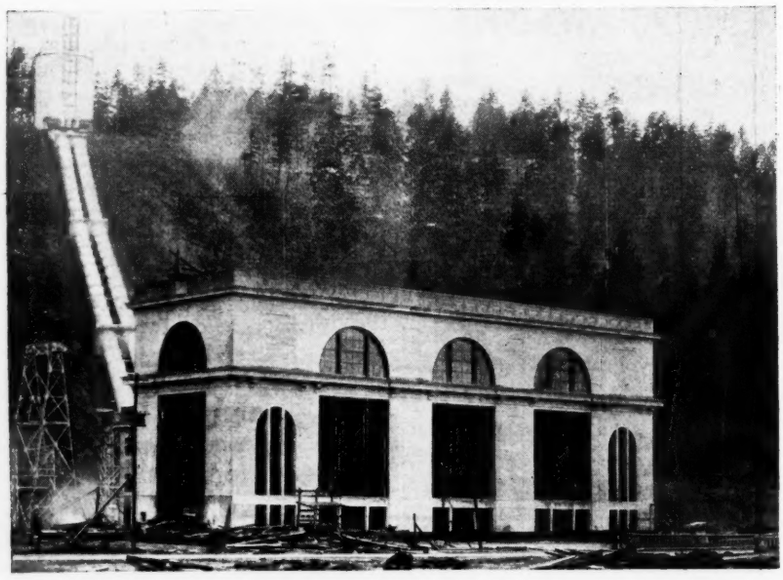
Two papers were scheduled for this session on air pollution and smoke abatement. However, the paper on "Air Pollution from the Engineer's Standpoint," by H. B. Meller, drew forth such extensive discussion that the second paper, "Smoke and Dust Abatement," by M. D. Engle, was postponed until the Thursday morning session, when it was the first paper to be presented. The paper by Mr. Meller discussed the various effects of air pollution on meteorlogic conditions, on stone, on metals, on painting, vegetation, and its physiological and hygienic aspects. Mr. Engle's paper described various methods and equipment now available for reducing the smoke and dust from stacks.

Among the other papers presented at the Thursday morning session was a report of research work carried on at the society's laboratories for the purpose of determining wind velocity gradients near surfaces, and its effect on film heat conductance. This paper contained the results of some interesting basic research work.

Of particular interest to power engineers was the Thursday afternoon session, when papers were presented on heating with exhaust steam, by Perry West, and the off-peak system of electric heating for buildings, by Elliott Harrington. In the paper on off-peak electric heating, the author indicated that, generally speaking, a rate of one cent per kilowatt-hour will give an operating cost approximately equal to the cost of heating with manufactured gas at $1.10 per thousand cubic feet. A rate of one-half cent per kilowatt-hour would give a cost approximately equal to that of anthracite coal at $18 per ton. Utilities in Florida, Georgia, Illinois, Indiana, Iowa, Ohio, Virginia, Pennsylvania and New Jersey have established off-peak house-heating rates ranging from approximately 0.75 to 1.5 cents per kilowatt-hour.

▼ ▼ ▼

FINISH FIRST UNIT AT CUSHMAN NO. 2



Power house at the Cushman No. 2 hydro-electric project of the City of Tacoma, Wash., where the first 37,500-hp. unit was placed in service on Jan. 1. A second similar unit is under construction and will be ready some time this spring. Ultimate plans call for the installation of four such units, the last two of which are to be installed at an indefinite future date. A detailed description of this plant appeared in *Power* for Dec. 9, 1930, page 949

Senate Proceeds Against Power Commissioners

IN ORDER TO OBLIGE SENATORS who want to test in the courts the validity of the confirmation of three of the new Federal Power Commissioners, the Interstate Commerce Committee last week reported out the names of these three men without recommendations. This was done despite the fact that some of the committee members feel that the confirmation of the three commissioners in question—George Otis Smith, Marcel Garsaud, and Claude L. Draper,—is beyond recall. The committee yielded, however, to the requests made by Senators opposing the retention in office of these men. It was contended in this connection that unless the names are reported out and unless the Senate refuses to confirm them, it would be difficult to institute

legal proceedings to question the right of the President to retain the commissioners in office.

Another step in the campaign to take the matter to the courts was accomplished when the committee on contingent expenses gave its approval to the use of Senate funds to engage counsel to help in the litigation. A resolution previously passed by the Senate authorizes the expenditure of $2,500 to engage counsel. Such counsel would act in conjunction with the District Attorney for the District of Columbia whom the resolution directs to start the proceedings.

On Feb. 4 the Senate rejected the nomination of Mr. Smith, chairman of the commission, by a vote of 40 to 33. At the same time it reconfirmed the nominations of Messrs. Garsaud and Draper by votes of 39 to 35 and 39 to 36, respectively. On Feb. 5 the Senate formally asked the district attorney to institute court action to oust Chairman Smith.

Niagara Hudson Endorses St. Lawrence Project

THE NIAGARA HUDSON POWER CORPORATION will agree to state production of St. Lawrence River power, and will be willing to make a contract calling for a seven per cent return for its distribution, compared with eight per cent allowed utility companies by the courts, Floyd L. Carlisle, chairman of the board of the corporation, said at the Albany Chamber of Commerce dinner on Feb. 2.

His statement was the first announcement by the company of its attitude toward the St. Lawrence Power Development Commission report and disclosed that the company is in agreement with the engineering and marketing reports of that body, providing for distribution of the power through the existing network.

Governor Roosevelt, also a speaker at the dinner agreed with Mr. Carlisle, that the "differences are not great" between them. In his brief reference to the power situation, he said, "I hope very much, and see no reason why we will not be able to agree on the methods for this development. The only difference, and it is not great, is that all my life I have been a buyer of power and Floyd (Mr. Carlisle) has been a seller of power. The problem is to bring the buyer and the seller together."

Mr. Carlisle, declaring the problem to be economic and "involving no political question," challenged the Governor's often stated position that the purpose of the St. Lawrence development is to secure lower rates for the householder and farmer. "If you took all the power of the St. Lawrence and held it for the use of householders," he said, "you would not use 15 per cent of it—and you would have to charge enough for the 15 per cent to pay for the 100 per cent of its cost."

He said he hoped that a public authority would be created immediately to carry forward plans for the project and that negotiations would be pushed to secure the approval of the federal government and Canada. In regard to the contract for distributing the power, Mr. Carlisle stated:

"Any contract we make has got to be fair, and it must be continuous. Governors and legislators may change, but the power will go on. The worst thing that could happen to us is to try to take advantage of the people of the state in this matter. There are 13,000,000 people in this state, many of whom would certainly be heard in opposition to such course. The big thing is to stop the bickering and get it done."

"STOPPING" MOTION AT 95 MI. AN HOUR

Acme—P. & A.

Developed by Harold E. Edgerton at the Massachusetts Institute of Technology, this new stroboscope makes it possible to take clear "still" or moving pictures of the moving parts of high-speed machinery. When this photograph of a 160-hp. motor was made, the letters N and S on the north and south poles of the rotor were moving past the camera lens at 95 miles per hour linear speed. Mr. Edgerton is shown watching the thyratron mercury arc tube, the intense actinic light of which makes it possible to take photographs at exposures of ten millionths of a second

▼ ▼ ▼

1930 Orders for Boilers 29 Per Cent Below 1929

NEW ORDERS for steel boilers placed during 1930 amounted to 13,166 boilers with a total square footage of 13,470,390, according to reports submitted to the United States Bureau of the Census by 81 manufacturers comprising most of the leading establishments in the industry. Compared with total sales of 18,526 boilers of 19,468,534 sq.ft. during 1929, orders in 1930 showed a decrease of approximately 29 per cent.

In December, 1930, new orders for 814 boilers of 587,053 sq.ft. were placed, as compared with 777 boilers of 709,322 sq.ft. in November, 1930, and 1,029 boilers of 880,172 sq.ft. in December, 1929, it is reported by the bureau.

Commission's Right to Audit Project Expenses Upheld

THE RIGHT of the Federal Power Commission to audit the capital expenditures of the hydro-electric projects licensed under the water power act was upheld in a sweeping decision handed down Jan. 29 by Justice Jesse C. Adkins of the District of Columbia Supreme Court.

Denying the temporary injunction sought by the Clarion River Power Company of Pennsylvania, Judge Adkins fully sustained the contentions of Charles A. Russell, former solicitor of the power commission. Russell appeared for the commission when the case was argued in October. He contested the claim of the power company that the commission was without authority to require the company to omit from its accounts cost items not held by the commission to be "legitimate expenditures."

The suit was brought after William V. King, chief accountant of the commission, who was discharged with Russell but later reinstated, had eliminated in his preliminary audits $6,386,000 from the Clarion's listed capital expenditures of $11,132,000, and asked the company to show how the questionable items had been "actually and legitimately expended." Contending that the water power act provided for such showing only after the expiration of the fifty-year license, or twenty years at the earliest, the company refused to appear before the commission.

Capitol Power Plant to Continue Using Coal

DURING COMMITTEE HEARINGS on the legislative establishment appropriation bill now before Congress, it was pointed out by officials in charge of the operation of the Capitol power plant that coal is still the cheapest fuel for their purposes. The committee was informed that a careful study was made of whether or not it would be more economical to use fuel oil. As a result of this study, the power plant officials decided to stick to coal.

The Capitol power plant furnishes heat and power to the buildings on the Capitol Plaza. These are the Capitol Building, the Senate and House office buildings, and the Library of Congress. The plant will also be called upon to take care of the heating and lighting requirements of the new Supreme Court building and the House office building annex.

An amount of $362,070 is provided in the appropriation bill for the operation of the plant during the fiscal year of 1932. The average price paid for coal last year was $4.65 per ton. The estimates this year are based on a cost of $4.80 per ton. A total of 40,871 will be used during the next fiscal year, according to the estimates.

New England Council Offers Employment Aids

MEASURES regarded as most helpful toward increasing and maintaining employment in New England are presented in the report of a referendum conducted among New England manufacturers and other business interests by the Industrial Committee of the New England Council and presented Feb. 3 at a joint meeting in Boston of that committee and the presidents of the state manufacturers' associations of New England.

More than 70 per cent of the 1,000 individuals voting on the referendum declared that the first essential is to hold actual layoffs to a minimum and substitute the elimination of overtime and the reduction of weekly hours. New England industry, it appears, is following this policy to an unprecedented degree at present, according to the Council's Industrial Committee.

Next in order of emphasis is the recommendation to New England firms to merchandise aggressively by developing new products to meet new or changing needs; by finding new uses for present products; by improving quality and packaging, or presenting the product more attractively; by eliminating slow-selling lines, unprofitable accounts and territories; and by advertising consistently.

The third important step advocated by the consensus of replies calls upon New England employers to maintain employee morale by providing wages and working conditions on levels enabling their employees to prosper as well in New England as they might elsewhere, and to keep them informed on the employer's efforts to maintain steady work.

The fourth measure urged is that people with stable incomes buy for their normal needs.

The relative rank of other proposals as shown by the votes includes modernization of products, plant equipment, elimination of waste, and planning of operations on a long-time basis.

COMING CONVENTIONS

American Society of Mechanical Engineers. National Fuels Meeting in Chicago, Ill., Feb. 10-13. Semi-annual meeting in Birmingham, Ala., Apr. 20-23. Meeting at Hartford, Conn., June 1-3. National Oil and Gas Power Meeting at the University of Wisconsin, Madison, Wis., June 15-18. Secretary, Calvin Rice, 33 West 39th St., New York City.

American Institute of Electrical Engineers. District meeting in Pittsburgh, Pa., March 11-13. District meeting in Rochester, N. Y., Apr. 29-May 2. Annual summer convention in Asheville, N. C., June 22-26. Secretary, F. L. Hutchinson, 33 West 39th St., New York City.

American Society of Refrigerating Engineers. Spring meeting at the Hotel President, Kansas City, Mo., May 6-8. Secretary, David L. Fiske, 37 West 39th St., New York City.

American Society for Testing Materials. Annual meeting at the Stevens Hotel, Chicago, Ill., June 22-26. Secretary, C. L. Warwick, 1315 Spruce St., Philadelphia, Pa.

American Welding Society. Annual meeting in New York City, Apr. 22-24. Secretary, M. M. Kelly, 33 West 39th St., New York City.

Association of Iron and Steel Electrical Engineers. Annual meeting and exposition at the Cleveland Public Auditorium, Cleveland, Ohio, June 15-19. Managing director, John F. Kelly, Empire Building, Pittsburgh, Pa.

Midwest Power Engineering Conference and Exposition. Fifth meeting in Chicago, Ill., Feb. 10-13. Secretary, George E. Pfisterer, 308 West Washington St., Chicago, Ill.

National Association of Power Engineers. Annual convention and mechanical exposition in the Convention Hall, Kansas City, Mo., Sept. 7-11. Secretary, Fred W. Raven, 417 South Dearborn St., Chicago, Ill.

National District Heating Association. Annual convention at the Hotel Statler, Boston, Mass., June 2-5. Secretary, D. L. Gaskill, Greenville, Ohio.

National Electric Light Association. Annual convention in the Atlantic City Auditorium and Convention Hall, Atlantic City, N. J., June 8-12. Secretary, A. Jackson Marshall, 420 Lexington Ave., New York City.

Third International Conference on Bituminous Coal. At Carnegie Institute of Technology, Pittsburgh, Pa., Nov. 16-21. Chairman, Thomas S. Baker, president of Carnegie Institute of Technology.

Universal Craftsmen Council of Engineers. Annual convention at the Stevens Hotel, Chicago, Ill., Aug. 4-8. Grand Secretary, T. H. Jones, 33 Linden Ave., Cherrydale, Va.

Personals

P. S. DICKEY has been appointed research engineer of the Bailey Meter Company of Cleveland, Ohio. Mr. Dickey is a graduate in mechanical engineering of Purdue University, and during the past few years has been specializing on automatic combustion control problems for the Bailey company.

ROY WILKINS has been appointed vice-president in charge of engineering of the Pacific Electric Manufacturing Company. Before joining that company in 1928, Mr. Wilkins was assistant engineer in the division of hydro-electric and transmission engineering of the Pacific Gas & Electric Company. He is widely known for his corona research and knowledge of high-voltage oil circuit breakers.

ALMON D. BRISTOL, formerly assistant master mechanic of the Garlock Packing Company of Palmyra, N. Y., has been made master mechanic of the company to succeed the late JUDSON D. GARLOCK, who died on Jan. 20.

ARTHUR E. LACROIX has been appointed report manager for the wholesale companies of the New England Power Association. His new work will cover the collecting and preparing of data for all hydro-electric investigations and economic studies of the company.

FRANK B. WILLIAMSON of Washington was elected vice-chairman of the newly reorganized Federal Power Commission at a recent meeting of that body.

HOWARD BUTT has been made manager of the recently established engineering and export department office at 50 Church St., New York City, of the Wm. Powell Company of Cincinnati, Ohio.

WINTHROP PYEMONT has been appointed contract engineer for the wholesale companies of the New England Power Association. In his new work he will have general supervision of all wholesale power contracts made by the company.

LEON F. RAINS, formerly vice-president of the Columbia Steel Company of San Francisco, Calif., has recently been made president of the A. M. Byers Company.

HENRY O. WESTENDARP has retired from service in the New England district office of the General Electric Company, after 40 years' connection with that company and its predecessor, the Thomson - Houston Electric Company. For some years Mr. Westendarp assisted in the development of many devices, ranging from fluid-type maximum-demand meters to uniflow steam engines, at the Thomson research laboratory in Lynn, Mass. Entering sales work in 1919, he specialized in centrifugal-compressor and arc-welding applications.

Business Notes

CONSOLIDATED ASHCROFT HANCOCK COMPANY, Bridgeport, Conn., reports that for the year 1930 the operations of the company showed satisfactory net earnings. Despite the fact that these earnings were smaller than those of preceding years, they deserve favorable comment based on the recognition of more strenuous business conditions prevailing throughout the past year, the company states.

HYDRAUGER CORPORATION, LTD., San Francisco, Calif., announces the appointment as sales engineer of W. A. Kohlhoff, formerly in the gas engineering department of the Pacific Gas & Electric Company. In his new work Mr. Kohlhoff will soon make a business tour of the country for the purpose of establishing distributing agents for the corporation on the Atlantic Coast, in the South and the Middle West.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, East Pittsburgh, Pa., has appointed the Woodbury & Wheeler Company of Portland, Ore., distributor of Westinghouse's complete line of welding equipment ranging from automatic to manual machines.

MODERN COAL BURNER COMPANY, Chicago, Ill., announces that George F. Klein has been placed in charge of sales and distribution of its products in eastern Kansas, eastern Nebraska, northern and western Missouri. The offices for this district are located in Room 432, Dwight Building, 1004 Baltimore Ave., Kansas City, Mo.

How's Business?

DURING THE LAST HALF OF JANUARY the slight improvement evident after the turn of the year petered out. Our index has been sagging for three weeks, and as the month closed it was slightly under the December low, at 76.8% of normal, by preliminary figures. The January level averaged about the same as November, but a little above December. January's upturn in pig-iron output—first since last April, may be another sign that the low point was passed in December. But the recent slackening of the rate of improvement in steel, coal and power production, building, car loadings and check payments suggests how irregular, feeble and protracted recovery is likely to be when it is left merely to the "invisible hand" and like "natural" forces within business itself, without the support and stimulation of external factors brought to bear by intelligent, courageous and cooperative banking.—*The Business Week*, Feb. 11.

WITH THE SOCIETY SECTIONS

A.S.M.E., Anthracite-Lehigh Valley Section. Meeting in the ballroom of the Sterling Hotel, Wilkes-Barre, Pa., Feb. 20 at 8 p.m. Subjects: "Research in Anthracite," by Prof. H. G. Turner, Lehigh University; "Development of the Hardinge Mill With Particular Reference to the Problems That Have Been or Must Be Overcome for the Successful Commercial Use of Pulverized Anthracite," by H. C. L. Miller, Fuller Lehigh Company.

A.S.M.E., Boston Section. Inspection trip to Edison Plant, followed by meeting at the Engineers Club, Feb. 18 at 7:30 p.m. Subject: "Central Heating in Boston," by D. S. Boyden and M. D. Engle, Edison Electric Illuminating Company of Boston.

A.S.M.E., Metropolitan Section. Power Division meeting in Room 501, Engineering Societies Building, on Feb. 24 at 8 p.m. Subject: "Some Suggestions Regarding Harmonious Relationships Between Boiler Water and Metal," by R. E. Hall, Hall Laboratories, Inc.

A.S.M.E., Philadelphia Section. Meeting at the Engineers' Club on Feb. 24 at 8 p.m. Subject "Research in Industry," by C. F. Hirshfeld, Detroit Edison Company. The meeting will be preceded by dinner at 6 p.m.

New York Building Superintendents' Association. Eleventh annual banquet and grand ball on Saturday evening, Feb. 14, in the main ballroom of the Hotel Commodore, New York City. Reservation secretary, John D. McDonald, 439 East 51st St., New York City.

▼

Trade Catalogs

SPEED REDUCERS—A special bulletin covering the new line of worm-gear speed reducers developed by W. A. Jones Foundry & Machine Company, 4401 West Roosevelt Road, Chicago, Ill., has just been issued by the company. These reducers are for small electric motor drives, capacities up to 7 hp. and ratios from 5-1 up to 50-1.

INSULATION — A new 16-page, illustrated publication, identified as Circular 1686-A and entitled "Micarta in the Central Station," has recently been issued by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. The bulletin describes the many applications of this insulating material in the power plant.

FLOW CONTROL—The Foxboro Company, Foxboro, Mass., has recently issued Bulletin No. 170 on automatic flow controllers. This 40-page, illustrated publication covers completely the field of flow control, including ratio flow control, liquid level control and flow control under high pressures.

ELECTRICAL HEATING EQUIPMENT—Catalog No. 247 covering industrial electric heating equipment has recently been issued by the Westinghouse Electric & Manufacturing Company, Industrial Heating Division, Mansfield, Ohio. This 99-page publication, a complete and complehensive catalog of industrial heating equipment, contains full descriptions of various heating units, valuable engineering data and many illustrations of actual installations.

BELTING — Alexander Brothers, 14 South St., Philadelphia, Pa., have recently issued a set of charts showing the comparative efficiencies of "Tentacular" transmission belting and multiple-V belt drives. The tests were made at the Ohio State University and at the Official Laboratories of Arts and Metiers, Paris, France.

▼

Fuel Prices

FUEL OIL

New York — Feb. 5, f.o.b. Bayonne, N. J., 28@34 deg., Baumé, industrial use, tank-car lots, 4.5c. per gal.; f.o.b. Bayway, 36@40 deg., furnace, tank-car lots, contract, 6c. per gal.

St. Louis—Jan. 28, tank-car lots, f.o.b. St. Louis, 24@26 deg., $1.339 per bbl., or 42 gal.; 26@28 deg., $1.464 per bbl.; 28@30 deg., $1.589 per bbl.; 30@32 deg., $1.689 per bbl.; 32@36 deg., gas oil, 3.901c. per gal.; 38@40 deg., distillate, 4.526c. per gal.

Pittsburgh—Jan. 21, f.o.b. local refinery, 34@36 deg., fuel oil, 3.5c.@ 3.75c. per gal.; 36@40 deg., 3.37½c.@ 3.75c.

Philadelphia — Feb. 2, No. 4, light, $1.31 per bbl.; No. 5, medium, $1.22; No. 6, heavy (Bunker C) $1.10.

Cincinnati — Jan. 20, tank-car lots, f.o.b. local refinery, 24@26 deg. Baumé, 4.5c. per gal.; 26@30 deg., 4.75c. per gal.; 30@32 deg., 5c. per gal.

Chicago—Jan. 16, tank-car lots, f.o.b. Oklahoma, freight to Chicago, 90c. per bbl. or 42 gal.; 18@22 deg., 60c. per bbl.; 22@26 deg., 67.5c. per bbl.; 26@30 deg., 80c. per bbl.; 30@32 deg., 95c. per bbl.; 32@36 deg., gas oil, 2.25c. per gal.

Boston — Feb. 2, tank-car lots, f.o.b. 12@14 deg., Baumé, 3c. per gal.; 28@32 deg., 5c. per gal.

Dallas—Jan. 31, f.o.b. local refinery 24@26 deg., $1.10 per bbl. or 42 gallons.

COAL

Bituminous (Net Tons)	At Mine, for Shipment to	Price per Ton
Pool 9, super low-vol..	New York...	$1.90 @$2.25
Pool 10, h. gr. low-vol.	New York...	1.75 @ 1.85
Pool 11, low-vol.....	New York...	1.60 @ 1.75
Smokeless, mine-run..	Chicago.....	1.75 @ 2.25
Smokeless, slack.....	Chicago.....	.75 @ 1.35
Harlan, Ky., slack....	Chicago.....	.70 @ 1.00
Franklin, Ill., mine-run	Chicago.....	2.15
Franklin, Ill., screen...	Chicago.....	1.50 @ 1.60
Ind. 5th Vein, m.-r....	Chicago.....	1.50 @ 1.85
Standard Ill., mine-run	St. Louis.....	1.50
W. Ky., mine-run	Louisville....	1.25 @ 1.50
W. Ky., slack.....	Louisville ...	.30 @ .40
Pittsburgh, mine-run.	Pittsburgh....	1.35 @ 1.45
Smokeless, mine-run..	Cincinnati...	1.75 @ 2.00
Smokeless, slack.....	Cincinnati...	.75 @ 1.35
Kanawha, mine-run..	Cincinnati...	1.10 @ 1.35
Kanawha, nut-slack.	Cincinnati...	.50 @ .75

Anthracite (Gross Tons)	At Mine, for Shipment to	Price per Ton
Buckwheat.....	New York...	$3.50
Barley.....	New York...	1.50

New Plant Construction

COMPILED BY THE McGRAW-HILL BUSINESS NEWS DEPARTMENT, WHICH IS PREPARED TO FURNISH A MORE COMPLETE DAILY SERVICE TO THOSE WHO WISH IT

Calif., Alhambra—City plans the construction of a new municipal power and light plant. Burns & McDonnell Engineering Co., 400 Interstate Bldg., Kansas City, Mo., are engineers.

Calif., Los Angeles — T. D. Barnett, 6372 Hollywood Blvd., is having preliminary plans prepared for a 12 story office and stores building, including steam heating system, elevators, etc., at Hollywood Blvd. between Wilcox and Cahuenga Aves. Estimated cost $750,000. Morgan, Walls & Clements, 1135 Van Nuys Bldg., are architects.

Calif., Millbrae — Millbrae Utilities District, voted $15,000 bonds for the construction of a waterwroks system, including distribution system, pumping plant, etc.

Calif., Palo Alto—City plans the construction of a municipal power plant. Burns & McDonnell Engineering Co., 400 Interstate Bldg., Kansas City, Mo., are engineers.

Calif., Pomona—City is having plans prepared for the construction of an auxiliary pumping plant in connection with waterworks. F. G. Froehde is city engineer.

Calif., San Mateo—City is having plans prepared for the construction of a municipal power and light plant. Burns & McDonnell Engineering Co., 400 Interstate Bldg., Kansas City, Mo., are engineers.

Calif., Upland—City plans an election to vote $45,000 bonds for waterworks improvements, including drilling of deep well, reservoir, pumping equipment, etc.

Colorado — Southern Colorado Power Co., Colorado Bldg., Pueblo, plans to expend $240,000 during 1931 for the construction of a new outdoor substation at Ordway District, additional transformer capacity at La Junta and extensions to distribution lines between Rocky Ford and Ordway.

Ind., West Lafayette—Purdue University, R. B. Stewart, Comptroller, will receive bids about Mar. 1 for addition to power plant. Estimated cost $100,000. W. Scholer, 210 Wallace Bldg., Lafayette, is engineer. Boilers and equipment will be required.

Mass., East Springfield—United Electric Light Co., J. P. McKearin, Ch. Engr., 73 State St., Springfield, is having plans prepared for the construction of a sub-station at Page Blvd. and Roosevelt Ave. Estimated cost $40,000. Private plans.

Mass., Wakefield — Town, G. A. Packard, Comr., plans driven wells and pumping station in connection with waterworks. Estimated cost $40,000.

Mich., Detroit—F. P. Miller, Cadillac Sq. Bldg., is having plans prepared for a 14 story office building including steam heating system, boilers, elevators, etc., at Lafayette and Cass Aves. Estimated cost $1,000,000. H. Reid, c/o owner, is architect.

Mich., Monroe—Sisters, Servants of the Immaculate Heart of Mary, awarded contract for the construction of a group of academy buildings, including central heating plant, etc., on West Elm St., to W. E. Wood Co., Union Trust Bldg., Detroit. Estimated cost $2,500,000.

Minn., Minneapolis — Minneapolis Columbus Club Inc., Elks Bldg., E. J. Loring, Chn. of Building Commission, 642 McKnight Bldg., will receive bids until Feb. 12 for the construction of a 12 story club and hotel building, including steam heating system, swimming pool, etc., at 12th St. and LaSalle Ave. Estimated cost $1,000,000. Bertrand & Chamberlin, 616 Civic & Commerce Bldg., are architects.

Minn., Minneapolis—Treasury Dept., Office of J. A. Wetmore, Acting Supervising Archt., Washington, D. C., will soon receive bids for the construction of a post office, including steam heating system, etc., between Marquette and Second Ave. S. and First and Second Sts. Estimated cost $3,500,000. Magney & Tusler, 104 South 9th St., Minneapolis, are architects.

Mo., Carnthersville—City plans an election Mar. 3 to vote $90,000 bonds for the construction of a power plant, generating equipment, and distribution system. Russell & Axon, 6200 Easton Ave., St. Louis, are engineers.

Neb., Grand Island—City, H. E. Clifford, Clk., will receive bids until Mar. 4 for the construction of a sewage disposal plant including pump and blower house, etc. Estimated cost $130,000. Black & Veatch, 700 Mutual Bldg., Kansas City, are engineers.

Neb., Lincoln—Mount Moriah Holding Corp., c/o E. G. Stage, 1905 Y St., is having preliminary plans prepared for the construction of a hospital, including heating plant, laundry, etc., at 56th and Lillibridge Sts. Estimated cost $260,000. Meginnis & Schaumberg, 614 Federal Trust Bldg., are architects.

N. J., Atlantic City—Atlantic Towers Corp., 26 Court St., Brooklyn, N. Y., awarded contract for a 16 story hotel on Boardwalk to William Kennedy Construction Co., 215 Montague St., Brooklyn, N. Y. Estimated cost $6,000,000. Steam heating and ventilation systems, boilers, elevators, etc., will be installed. Maturity indefinite.

N. Y., Buffalo—University of Buffalo, plans the construction of a central heating plant. Green & Hopkins, Niagara Sq., are architects. J. W. Danforth Co., 70 Ellicott St., are engineers.

N. Y., New York—H. Mandel, 10 East 40th St., plans the construction of a 19 story apartment building at 7th Ave. and West 22nd St. Estimated cost $1,000,000. Farrar & Watmough, 10 East 40th St., are architects. Work will be done by separate contracts.

O., Shelby—City is having preliminary plans prepared for improvements to power and light plant. Estimated cost $225,000. Burns & McDonnell Engineering Co., 400 Interstate Bldg., Kansas City, Mo., are engineers.

Tex., Galveston—Gulf Colorado & Santa Fe Ry. Co., is having plans prepared for an 8 story office building, including boiler house, etc., at 25th and Strand Sts. Private plans. Work will start about Mar. 15.

Tex., Wichita Falls — City, c/o G. D. Fairtrace, Mgr., will receive bids until Feb. 24 for waterworks improvements, including pumping station, filter equipment, etc. Estimated cost $1,000,000. Montgomery & Ward, 544 Harvey-Snider Bldg., are engineers. Black & Veatch, Mutual Bldg., Kansas City, are consulting engineers.

Tex., Wichita Falls — City is having preliminary plans prepared for the construction of a municipal ice plant. Estimated cost $25,000.

Wash., Seattle—Bd. of Public Works, will receive bids about Feb. 25 for the construction of a sewage system including three pumping stations, etc. R. H. Thomson is engineer.

Man., Winnipeg — Northwestern Power Co. Ltd., Electric Railway Chambers, is having plans prepared for the construction of a 36 x 90 ft. electrical sub-station on Harrow St. Estimated cost $300,000. Carter-Halls-Aldinger Co. Ltd., Royal Bank Bldg., are probable contractors.

Ont., Colborne—City plans the construction of a waterworks system, including pump house, pumps, mains, etc. Estimated cost $65,000. D. H. Fleming, Metropolitan Bldg., Toronto, is engineer. Contract for drilling of wells let to Layne Canadian Water Supply Co., Metropolitan Bldg., Toronto.

Que., Lachine—City, Hector Daoust, Esq., Clk., will receive bids until Feb. 19 for the construction of a waterworks pumping station and filter plant. Crepeau & Hunter, 1112 Dominion Sq. Bldg., are consulting engineers.

Yuyoslavia, Novisad — Novisad Electric Co., c/o Internatinoal Public Service Corp., c/o J. G. White & Co., 37 Wall St., New York, N. Y., plans the construction of a power plant, additional facilities, etc., here. Estimated cost to exceed $1,000,000. Maturity indefinite.

Equipment Wanted

Boiler Equipment—Bedford Hills, N. Y.—Dept. of Correction, State Capitol, Albany, will receive bids late in February for refrigeration plant, boiler equipment, etc., at New York State Reformatory for Women here.

Electrical Equipment — Muskegon Heights, Mich.—City will receive bids until Mar. 4 for electrical equipment for proposed sewage disposal works. Estimated cost $118,000.

Engine—O'Fallon, Mo.—G. Nolt, Route 2, plans to purchase a 10 hp., oil or gasoline engine.

Pump and Engine—Moscow, Idaho—City Council is receiving bids for 1,000 to 1,200 g.p.m. pump and 120 to 150 hp. Diesel engine.

Pumps—Kansas City, Kan.—Bd. of Public Utilities, City Hall, will receive bids until Feb. 18 for pumps for power plant addition to municipal water and light plant.

Pumps—Nepean, Ont.—City plans to purchase electrically driven centrifugal pumps, etc., for proposed waterworks pumping station on Pontiac Rd. Estimated cost $35,000.

Pumps, etc.—Jackson, Mich.—City plans to purchase pumps, etc., in connection with proposed extensions to waterworks. Estimated cost $380,000.

Pumps, etc. — Port Robinson, Ont. — —City plans to purchase electric pumps, etc., for proposed waterworks improvements. Estimated cost $25,000.

Transformers—Seattle, Wash.—Bd. of Public Works, will soon receive bids for twenty-four 100 kva. single ph., 60 cycle, 4,330/125-250 v. submersible subway transformers, thirty-six 150 kva. single ph., 60 cycle, 4,330/125-250 v. submersible subway transformers and 252 cable external reactors, 1,200 amp. 60 cycle, 1.44 kva. 1.2 v. for municipal light department.

Industrial Projects

Calif., Los Angeles—Benedict & Co. Ltd., c/o W. P. McNeil Co., 4814 Loma Vista Ave., Archts., manufacturers of refrigerators, is having preliminary plans prepared for a 1 and 2 story factory and warehouse. Estimated cost $150,000.

Ill., Belleville—Peerless Enameling & Stamping Co., R. G. Willman, Secy., awarded contract for a 1 story, 110 x 120 ft. addition to factory at 1500 West Lincoln St. to Bergmann & Lutz, 519 Scheel St.

Ia., Burlington—Iowa Soap Co., will build a 4 story, 70 x 100 ft. addition to soap factory. Estimated cost $75,000. Work will be done by day labor.

N. J., East Rutherford — East Rutherford Syringe Co., 75 Mozart St., is having revised plans prepared for a 2 story factory at 54 Mozart St. Estimated cost $40,000. Architect not announced.

N. J., Jersey City — B. Singer, 921 Bergen Ave., Archt., will receive bids about Mar. 15 for a 2 story, 45 x 140 ft. factory on Crawford St. for Jersey City Ladder Co., Inc., 677 Montgomery St. Estimated cost $50,000.

N. J., Newark — M. N. Shoemaker, 10 Bleecker St., Archt., will receive bids about Mar. 15 for a 2 story addition to factory at 361-65 6th Ave., for Weldon Roberts Rubber Co., 18 Oliver St. Estimated cost $40,000.

O., Canton—Union Carbide & Carbon Co., 30 East 42nd St., New York, N. Y., plans the construction of an acetylene gas manufacturing plant (Prest-O-Lite unit) on 17th St., here; also at Syracuse, N. Y. Estimated cost $50,000 each. Private plans. Maturity in May or later.

O., Cleveland — Cleveland Flux Co., K. H. Baum, Pres., 1026 Main Ave., awarded contract for a 2 story, 50 x 100 ft. factory at 1130 West 11th St., to A. S. Cook, 1246 Granger Rd., Lakewood. Estimated cost $40,000.

O., Middletown—Raymond Paper Co., awarded contract for a 1 story paper bag factory here to Albert M. Higley Co., Plymouth Bldg., Cleveland. Estimated cost $100,000.

Pa., Leechburg—Baker Findley Chemical Co., 1426 West 3rd St., Cleveland, O., let contract for a 1 story, 40 x 150 ft. chemical plant on Canal St., here, to Vandergrift Concrete Block Co., 321 Railroad St., East Vandergrift.

Pa., Sharpsville — Sharpsville Boiler Works, has work under way for addition to plant for the manufacture of meter pumps and service station equipment, by day labor.

Tex., San Angelo—Hormel, George A. & Co. of Texas, Ave. A. and James St., is having preliminary plans prepared for the construction of a packing plant, including refrigeration facilities, etc., here. Estimated cost $75,000.

Wash., Seattle — Ford Motor Co., 3674 Schaefer Rd., Dearborn, Mich., awarded contract for main assembly building oil house, etc., to Clinton Construction Co., also dredging, waterway, filling and removing docks and bulkheads in connection with assembly plant to Puget Sound Bridge & Dredging Co., Central Bldg. Estimated total cost $3,000,000.

Ont., Toronto — Toronto Brass Machine & Foundry Ltd., 74 Market St., is having plans prepared for a 1 story brass plant on Leslie St. Estimated cost $40,000 to $50,000. J. A. Thatcher, 37 Cowan Ave., is architect.

India—Ford Motor Co., 3674 Schaefer Rd., Dearborn, Mich., will soon award contract for the construction of assembly plants at Bombay, Calcutta, Madras and Multan here. Estimated total cost to exceed $1,000,000.

PRICES - MATERIALS - SUPPLIES

Electrical prices on following page are to the power plant by jobbers in the larger buying centers east of the Mississippi. Elsewhere the prices will be modified by increased freight charges and by local conditions.

SINCE LAST MONTH

A VERY slight improvement is noted in demand for electrical supplies, with January prices holding over into February. In power-plant supplies, declines occurred in hose and belting, with downward tendencies appearing in rivets and pipe. Wiping cloths are higher at New York and an erratic tin market has sent babbitt prices up about 1c. per lb. since January 13, 1931.

POWER-PLANT SUPPLIES

HOSE—Quotations at New York warehouses:

Fire Protection	50-Ft. Lengths
Underwriters' 2½-in., coupled, single jacket, net, per ft.	$0.59
Common, 2½-in., cotton, rubber-lined, 80c. per ft., list, less	60%

Air—Best Grade, Net

¾-in., per ft.	3-ply	$0.27	4 ply $0.32

Steam—Discounts from List

First grade.. 50–10% Second grade.. 50–10–5% Third grade.. 60–10–5%

RUBBER BELTING—List price, 6-in., 6 ply, $1.83 per lin.ft. The following discounts from New York warehouse list apply to rubber transmission belting:

Best grade....70% Second grade....65-5%

LEATHER BELTING—List price, 24c. per lin.ft., per inch of width, for single ply, at New York warehouses in quantities of about ½ doz. rolls:

Grade	Discount from list
Medium	30-10%
Heavy	30%

RAWHIDE LACING
- Cut lacing, best quality, 30-10%; 2nd quality, 50%.
- Lace leather sides, best, 12-17 sq.ft., 55c. per sq.ft.; 2nd, 48c., net.
- Giant or Indian tanned cut lacing, 30-10%.

PACKING—Prices per pound at New York warehouses:

Rubber and duck for low-pressure steam, ⅛ in.	$0.90
Asbestos for high-pressure steam, ⅛ in.	1.75
Duck and rubber for piston packing	.90
Flax, regular	1.15
Flax, waterproofed	1.70
Compressed asbestos sheet	.85
Wire insertion asbestos sheet	1.20
Rubber sheet	.45
Rubber sheet, wire insertion	.75
Rubber sheet, duck insertion	.55
Asbestos packing, twisted or braided and graphited, for valve stems and stuffing boxes	1.40
Asbestos wick, ½- and 1-lb. balls	.50

PIPE AND BOILER COVERING—Discounts from list at New York warehouses are as follows:

85% magnesia, high pressure		40 %
Asbestos, air cell, for low-pressure heating and return lines	4-ply	65 %
	3-ply	67½ %
	2-ply	70 %

PORTLAND CEMENT—New York, $2.20 per bbl., without bags, delivered by truck to site of job. Bag charge, 40c. per bbl.

STRUCTURAL STEEL—New York delivered price, beams and channels, 3 to 15-in.; angles, 3 to 6-in., ¼-in. thick; tees, 3-in. and larger; and plates, ¼-in. thick and heavier; all $3.10 per 100 lb. in lots of 400 to 3,999 lb.

COTTON WASTE—The following prices are in cents per lb., at warehouse:

	New York	Cleveland	Chicago
White	13.00	16.00	15.00
Colored	9.50	12.00	10.00

WIPING CLOTHS—Prices per pound in lots of about 600 lb., for washed, white wipers, as follows:

Chicago (100 lb. bales)	$0.14½
New York (100 lb. bales)	15
Cleveland (per thousand)	38.00

LINSEED OIL—These prices are for raw oil in barrels, f.o.b., in 1 to 4 bbl. lots:

	New York	Minneapolis	Chicago
Per pound	$0.096	$0.101	$0.098

WHITE AND RED LEAD—Per 100-lb. keg, base price, f.o.b., New York:

	Dry	In Oil
Red	$13.25	$14.75
White	13.25	13.25

RIVETS—The following quotations apply on fair-sized orders from warehouse:

Tank rivets, $\frac{7}{16}$-in. diameter and smaller, list (Apr. 1, 1927) less 65% in full packages, for immediate delivery from warehouse stocks in New York and vicinity.

Structural rivets, ½-in., round head, full kegs, per 100 lb.:

New York	$4.25
Chicago	4.00
Pittsburgh mill	2.75

Broken kegs, about $1.50 higher.

REFRACTORIES—Prices in car-loads, f.o.b. plant:

Chrome brick, eastern shipping points	per net ton	$45.00
Chrome ore, ground, 40@50%, Cr_2O_3, in bulk	per net ton	22@25
Chrome ore, ground, 40@50%, Cr_2O_3, in sacks	per net ton	26@29
Chrome ore, crude, 40@50%, Cr_2O_3	per net ton	18.00@22.50
Magnesite brick, 9-in. straights	per net ton	65.00
Magnesite brick, 9-in. arches, wedges and keys	per net ton	71.50
Magnesite brick, soaps and splits	per net ton	91.00
Silica brick, Mt. Union, Pa.	per M	43.00
Clay brick, 1st quality, 9-in. shapes, Pennsylvania	per M	43@46
Clay brick, 1st quality, 9 in. shapes, Ohio	per M	43@46
Clay brick, 1st quality, 9 in. shapes, Kentucky	per M	43@46
Clay brick, 1st quality, 9 in. shapes, Maryland	per M	43@46
Clay brick, 1st quality, 9 in. shapes, Colorado	per M	40@43
Clay brick, 2nd quality, 9 in. shapes, Pennsylvania	per M	35@38
Clay brick, 2nd quality, 9 in. shapes, Ohio	per M	35@38
Clay brick, 2nd quality, 9 in. shapes, Kentucky	per M	35@38
Clay brick, 2nd quality, 9 in. shapes, Maryland	per M	35@38

BABBITT METAL—Delivered in case lots from New York warehouse, on orders of 100 lb. or over, cents per pound:

Genuine, highest grade	46.00
Commercial genuine, intermediate grade	34.00
Anti-friction metal, general service	30.00
No. 4 babbitt, f. o. b.	10.00

COLD-FINISHED STEEL—Shafting and screw stock, warehouse prices per 100 lb., base, are as follows:

	New York	Cleveland	Chicago
Round or hexagon	$3.40	$3.65	$3.35
Flat or square	3.90	4.15	3.85

BOILER FITTINGS—F.o.b. warehouse, Jersey City, N. J., discounts from list:

Copper ferrules	70%
Boiler flanges	65–5%
Boiler stay bolts	60%
Boiler patch bolts	20%
Boiler fitting-up bolts	45%
Pressed steel boiler lugs	10%

WROUGHT PIPE—The following basing discounts from list are for large mill lots at Pittsburgh mill:

BUTT WELD

Inches	Steel Black	Steel Galv.	Inches	Iron Black	Iron Galv.
1 to 3	64%	52½%	1 and 1¼	30%	13%

LAP WELD

2	57%	45½%	2	23%	7%
2½ to 6	61%	49½%	2½ to 3	26%	11%
7 and 8	58%	45½%	3½ to 6	28%	13%
9 and 10	56%	43½%	7 and 8	26%	11%
11 and 12	55%	42½%	9 to 12	26%	11%

BUTT WELD, EXTRA STRONG, PLAIN ENDS

1 to 1¼	62%	51½%	1 to 1½	30%	14%
2 to 3	63%	52½%			

LAP WELD, EXTRA STRONG, PLAIN ENDS

2	55%	44½%	2	23%	10%
2½ to 4	59%	48½%	2½ to 4	29%	15%
4½ to 6	58%	47½%	4½ to 6	28%	14%
7 and 8	54%	41½%	7 and 8	21%	7%
9 and 10	47%	34½%	9 to 12	16%	2%
11 and 12	4 %	33½%			

BOILER TUBES—Standard gage, manufactured in accordance with the specifications and requirements of the American Society of Mechanical Engineers and in compliance with the rules and regulations of the U. S. Steamboat Inspection Service, from New York warehouse stock, per 100 ft.:

Size, Inches*	B.W.G.	Toncan Seamless Iron	Knobbled Charcoal Iron	Seamless Steel	Lapwelded Steel
1	13	$34.00	.....	$18.00	.....
1¼	13	37.75	.....	20.25	.....
1½	13	38.00	$38.00	19.25	.....
1¾	13	30.00	30.00	22.00	.....
2	13	26.25	26.25	20.25	$19.00
2¼	13	34.50	34.50	23.00	25.00
2½	12	34.00	34.00	26.00	24.25
2¾	12	40.50	40.50	28.50	27.50
3	12	42.50	42.50	27.00	25.50
3¼	11	50.25	50.25	30.75	28.75
3½	11	54.50	54.50	33.25	31.50
4	10	67.00	67.00	40.00	38.00

These prices are based on stock lengths. If cut to special lengths billing will be based on the entire stock lengths. In addition to the foregoing, standard cutting charges are as follows:

2-in. and smaller.. $0.05 per cut
2¼ and 2½ in..... .06 per cut
3-in..... $0.09 per cut
3½ to 4 in.. .10 per cut

*External diameter.

ELECTRICAL SUPPLIES

ARMORED CABLE—Price per 1,000 ft., New-Style, A.B.C., with fibre bushing:

B. & S. Size	BX Two Cond. M. Ft.	BX Three Cond. M. Ft.	Lead Two Cond. M. Ft.	Lead Three Cond. M. Ft.
No. 14 solid....	$23.37	$38.24	$66.00	$86.75
No. 12 solid....	38.02	50.52	76.00	104.00
No. 10 solid....	52.10	66.22	95.00	124.00
No. 8 stranded..	85.34	105.22	133.00	185.00
No. 6 stranded..	123.58	148.81	180.00	253.00

Coils to 1000 ft., +10%; less than coil lots, +20%.

CONDUIT—Rigid iron, price per 1,000 ft.; **ELBOWS AND COUPLINGS,** per 100 pieces, extra. Delivered from New York warehouse. Discount of 5 per cent for payment in 10 days; 30 days net.

Size, Inches	GALVANIZED Conduit	GALVANIZED Elbows	GALVANIZED Couplings	BLACK Conduit	BLACK Elbows	BLACK Couplings
½	$60.89	$8.31	$4.79	$55.67	$7.14	$4.36
¾	77.61	10.94	5.85	70.53	9.41	6.24
1	111.26	16.35	8.94	100.80	14.07	8.14
1¼	150.53	22.47	12.59	136.38	19.71	11.54
1½	180.00	30.05	15.59	163.08	26.35	14.29
2	242.20	54.69	20.87	219.43	47.92	19.15
2½	382.95	90.49	29.81	346.95	79.41	27.34
3	500.80	233.74	44.70	453.72	204.21	41.01
3½	630.74	511.83	59.92	574.14	446.60	55.00
4	769.61	591.84	74.69	702.53	516.46	68.53
4½	896.51	892.12	111.40	818.37	777.99	102.16
5	1045.06	1240.73	122.91	953.99	1082.29	112.75
6	1355.64	1547.71	177.72	1237.49	1350.80	162.95

CONDUIT BODIES AND FITTINGS—Black or galvanized:

	Less Than $15 List	$15 List to $100	$100 List and Over
Standard package	15%	20%	28%
Less than standard package	10%	15%	20%

CUT-OUTS—Following are net prices, each, in standard-package quantities:

CUT-OUTS, PLUG, SOLID, NEUTRAL OR 2-FUSE

S. P. M. L.	$0.12	D. P. D. B.	$0.31
D. P. M. L.	.16	T. P. S. B.	.35
T. P. M. L.	.27	T. P. D. B	.47
D. P. S. B.	.16		

CUT-OUTS, N. E. C. FUSE, SOLID, NEUTRAL OR 2-FUSE

	0-30 Amp.	31-60 Amp.	60-100 Amp.
D. P. M. L.	$0.27	$0.70	$1.75
T. P. M. L.	.40	1.00	2.30
D. P. S. B.	.35	.87	.....
T. P. S. B.	.67	1.50	.....
D. P. D. B.	.65	1.75	.....
T. P. D. B.	1.12	3.00	.....
T. P. to D. P. D. B.	.75	2.10	.....

FLEXIBLE CORD—Price per 1,000 ft. in coils of 250 ft.:

No. 18 cotton reinforced heavy	$15.00
No. 16 cotton reinforced heavy	19.00
No. 18 cotton reinforced light	12.00
No. 16 cotton reinforced light	14.00
No. 18 cotton Canvasite cord	13.00
No. 16 cotton Canvasite cord	15.00
No. 16 super service cord or similar (2 wire) in 1,000 ft.	$64.00 *71.00
No. 14 super service cord or similar (2 wire) in 1,000 ft.	92.00 *101.00

*Less than 1,000 ft.

NATIONAL ELECTRIC CODE FUSES, NON-REFILLABLE—

250-Volt	Std. Pkg.	List	600-Volt	Std. Pkg.	List Each
3-amp. to 30-amp.,	100	$0.15	3-amp. to 30-amp.,	100	$0.30
35-amp. to 60-amp.,	100	.30	35-amp. to 60-amp.,	100	.60
61-amp. to 100-amp.,	50	.90	65-amp. to 100-amp.,	50	1.50
101-amp. to 200-amp.,	25	2.00	110-amp. to 200-amp.,	25	2.50
201-amp. to 400-amp.,	25	3.60	225-amp. to 400-amp.,	25	5.50
401-amp. to 600-amp.,	10	5.50	450-amp. to 600-amp.,	10	8.00

Discount: Less than one-fifth standard package, 60%; one-fifth to standard package, 65%; standard package, 70%.

RENEWABLE FUSES—List price each:

Sizes	250-Volt List-Price	600-Volt List-Price	Std. Pkg. Quantity	Carton Quantity
1 to 30-amp.	$0.50	$1.10	100	10
35 to 60-amp.	1.00	1.25	100	10
65 to 100-amp.	2.00	3.00	50	5
110 to 200-amp.	4.00	5.00	25	5
225 to 400-amp.	7.50	11.00	25	1
450 to 600-amp.	11.00	16.00	10	1

REFILLS—

1 to 30-amp.	$0.03 ea.	$0.05	100	100
35 to 60-amp.	.05 ea.	.06	100	100
65 to 100-amp.	.10 ea.	.10	50	50
110 to 200-amp.	.15 ea.	.15	25	50
225 to 400-amp.	.30 ea.	.30	25	25
450 to 600-amp.	.60 ea.	.60	10	10

Discount Without Contract—Fuses:	
Broken cartons	Net list
Unbroken cartons	17%
Ten unbroken cartons	34%
Discount Without Contract—Renewals:	
Broken cartons	Net list
Unbroken cartons	17%
Ten unbroken cartons	34%
Discount With Contract—Fuses:	
Broken cartons	5%
Unbroken cartons	20%
Ten unbroken cartons	36%
Discount With Contract—Renewals:	
Broken cartons	Net list
Ten unbroken cartons	36%

Carton quantities may be combined to obtain maximum discounts.

FUSE PLUGS, MICA CAP—

0-30 ampere, standard package (500), per 100	$2.50
0-30 ampere, less than standard package, per 100	2.75

LAMPS—Below are present quotations in less than standard package quantities on Mazda standard, A type bulbs:

100—130 Volt Watts	General Type	Price Each	200—260 Volt Watts	Special Type	Price Each
15	A 17	$0.20	25	A 19	$0.25
25	A 19	.20	50	A 21	.25
40	A 21	.20	100	A 23	.45
50	A 21	.20	...	...	.....
60	A 21	.20	...	...	.....
100	A 23	.35	...	...	.....

Carton quantities are subject to discount of 10% from list. Annual contracts ranging from $75 to $300,000 net, allow a discount of 15 to 40% from list.

PLUGS, ATTACHMENT—

	Each
Porcelain, separable, attachment plug	$0.18
Composition, 2-piece, attachment plug	.27
Swivel attachment plug	.12
Small size, 2-piece plug, composition	.06

RUBBER-COVERED COPPER WIRE—Per 1000 ft. f.o.b. New York:

No.	Solid Single Braid	Solid Double Braid	Stranded, Double Braid	Solid Duplex
14.	$4.75	$6.50	$7.10	$13.20
12.	6.90	8.00	9.00	17.00
10.	8.45	10.40	11.80	22.50
8.	13.00	15.00	17.15	32.00
6.	...	.....	23.00	.....
4.	...	.....	34.00	.....
2	.....	.....	47.00	.....
1.	.....	.....	70.00	.....
0	.....	.....	83.00	.....
00.	.....	.....	95 00	.....
000	.....	.....	117.00	.....
0000	.....	.....	142.00	.....

SOCKETS, BRASS SHELL—Price each, net:

	½ In. or Pendant Cap Key	½ In. or Pendant Cap Keyless	½ In. or Pendant Cap Pull	⅜ In. Cap Key	⅜ In. Cap Keyless	⅜ In. Cap Pull
Standard package	$0.12	$0.10	$0.16	$0.16½	$0.14	$0.20
Unbroken carton	.14	.12	.18	.18	.16	.21
Broken carton	.16	.14	.20	.20	.18	.24

WIRING SUPPLIES—

Friction tape, ¾ in., in less than 100 lb., 30c. per lb.; in 100 lb. lots, 28c. per lb
Rubber tape, ¾ in., in less than 100 lb., 32c. per lb.; in 100 lb. lots, 29c. per lb
Wire solder, in less than 100 lb., 28c. per lb.; in 100 lb. lots, 26c. per lb.
Soldering paste, 2 oz. cans ..... $1.10 doz.

ENCLOSED SWITCHES, KNIFE—Safety type, externally operated, 250 d.c or a.c., N.E.C.:

TYPE "C" FUSED BOTTOM

Size, Amp.	Double Pole, Each	Three Pole, Each	Four Pole Each
30	$3.50	$5.70	$9.00
60	9.00	11.00	14.00
100	14.00	17.00	29.00
200	22.00	29.00	48.00

Discounts:	
Standard package	40%
Less than standard package	35%